FEB 18 1921

VOL. 47 FEBRUARY 1921 No. 216

United States Naval Institute Proceedings

The writers only are responsible for the contents of their respective articles

CONTENTS

	PAGE
The Warfare of the Future.—Fiske	157
Suggestions for Improving Navy Morale.—Russell	169
Squantum, the Victory Plant.—Belknap	177
Good Steering.—Allen	187
The Fate of the Dreadnought.—Vroom and Stevens	191
Position Plotting by Radio Experts.—Collins	201
Under-Water Trajectories.—Hawkesworth	207
Perry's Expedition to Japan.—Kreut	215
Amalgamation.—Goss	231
Operations Ashore in the Dominican Republic.—McClellan	235
Discussion	247
Secretary's Notes	251
Professional Notes	253
Notes on International Affairs	288
Review of Books	295
Information Index	252

Copyright, 1921, by J. W. Conroy, Trustee for U. S. Naval Institute

Entered at the Post Office at Annapolis, Maryland, as Second Class Matter

WORLD'S ONLY MANUFACTURER

Moulded High Frequency—High Tension Insulators and Insulating Parts

INSULATORS, 1,000 TO 1,000,000 VOLTS

INSULATION "MADE IN AMERICA"

ELECTROSE

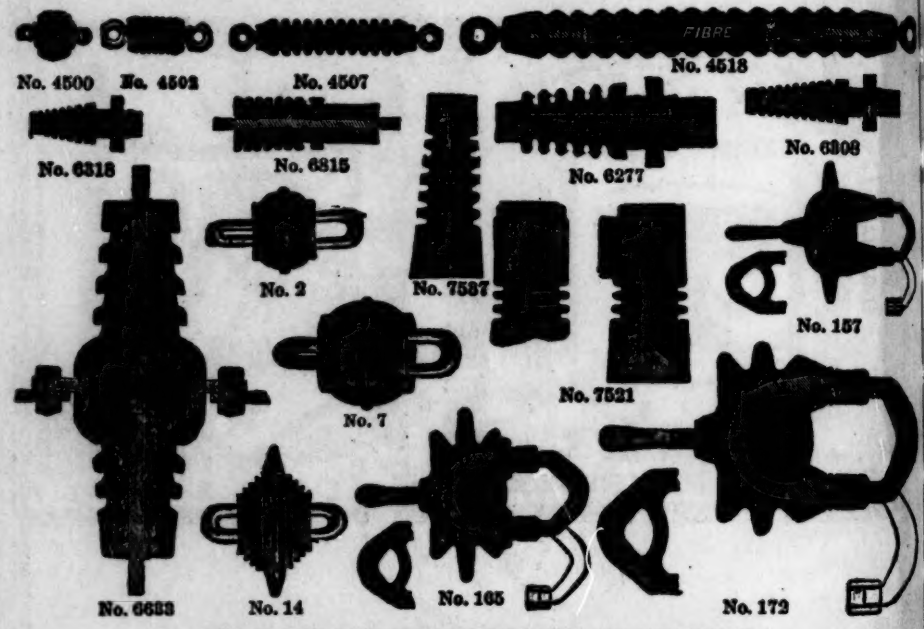
INSULATION "MADE IN AMERICA"

Louis Steinberger's Patents

"ELECTROSE" Insulators are standard with UNITED STATES NAVY and ARMY and WIRELESS TELEGRAPH and TELEPHONE COMPANIES.

"ELECTROSE" is made in a number of grades for various requirements, each grade possessing special characteristics.

"ELECTROSE" INSULATORS—BEST IN THE WORLD FOR HIGH FREQUENCY CURRENTS, POWER AND TRANSMISSION CIRCUITS



"ELECTROSE" STANDARD PRODUCTS

"Arcover" disk strain and suspension line insulators, "Safety Strain" insulators, Disk, Hood, Thimble and Rod type strain insulators, Spool and Bracket-Arm strain insulators, Pin type line insulators, Insulator pins, Roof, Barrier and Wall Bushings and Insulated Connectors, single and multi-part, plain and locking, water and gas tight, Bus-bar insulators, Insulating Supports and Pedestals, Arc Lamp Insulators, Insulating Knobs and Handles, Insulating Sheets, Tubes and Rods, etc., etc.

"Electrose" Railway Line Material:—"Safety Strain" Insulators, Brooklyn Strain Insulators, Insulated Turn-Buckles, Caps and Cones, "Ideal" Locking Caps and Cones, Insulated Bolts, Feed Wire Insulators, Third Rail Insulators, also special forms of Trolley Wire Suspension Insulators, etc., etc. Complete line always carried in stock.

Ignition Insulating Parts:—Distributor Blocks, Disks, Switch Bases, Spools, Brush Holders, Knobs, Handles, etc., etc.

"Electrose" insulation (certain grades) is recognized as the best obtainable for use in connection with insulating parts for ignition service for Automobiles, Aeroplanes, Motor Boats, etc.

Insulators and Insulating Parts and Devices of special sizes and forms, designed and made to order.

Sole Manufacturers

ELECTROSE MFG. CO.

66-82 Washington St. 27-37 York St.
66-76 Front St. 1-23 Flint St.
BROOKLYN, N. Y., AMERICA

Vol. 47, No. 2 February, 1921 Whole No. 216

United States Naval Institute

Proceedings

PUBLISHED MONTHLY
EDITED BY H. K. HEWITT

U. S. NAVAL INSTITUTE
ANNAPOLIS — MARYLAND

COPYRIGHT, 1921
By J. W. CONROY
TRUSTEE FOR U. S. NAVAL INSTITUTE

The Lord Baltimore Press
BALTIMORE, MD., U. S. A.

The writers only are responsible for the contents of their respective articles

CONTENTS

THE WARFARE OF THE FUTURE. By Rear Admiral Bradley A. Fiske, U. S. Navy 157

SUGGESTIONS FOR IMPROVING NAVY MORALE. By Commander C. F. Russell, U. S. Navy..... 169

SQUANTUM, THE VICTORY PLANT. By Captain Reginald R. Belknap, U. S. Navy 177

GOOD STEERING. By Lieut. Commander A. M. R. Allen, U. S. Navy.. 187

THE FATE OF THE DREADNOUGHT. By Lieut. Commander Guysbert B. Vroom, U. S. Navy, and William Oliver Stevens..... 191

POSITION PLOTTING BY RADIO EXPERTS. By Elmer B. Collins, Nautical Expert 201

UNDER-WATER TRAJECTORIES. By Alan S. Hawkesworth, F.R.S.A., Mathematician, Bureau of Ordnance 207

PERRY'S EXPEDITION TO JAPAN. By Mary H. Krout..... 215

AMALGAMATION. By Commander N. H. Goss, U. S. Navy..... 231

OPERATIONS ASHORE IN THE DOMINICAN REPUBLIC. By Major Edwin N. McClellan, U. S. M. C..... 235

DISCUSSION 247

SECRETARY'S NOTES 251

PROFESSIONAL NOTES 253

NOTES ON INTERNATIONAL AFFAIRS..... 288

REVIEW OF BOOKS 295

INFORMATION INDEX 252

OFFICERS OF THE INSTITUTE

President

REAR ADMIRAL BRADLEY A. FISKE, U. S. NAVY

Vice-President

REAR ADMIRAL A. H. SCALES, U. S. NAVY

Secretary and Treasurer

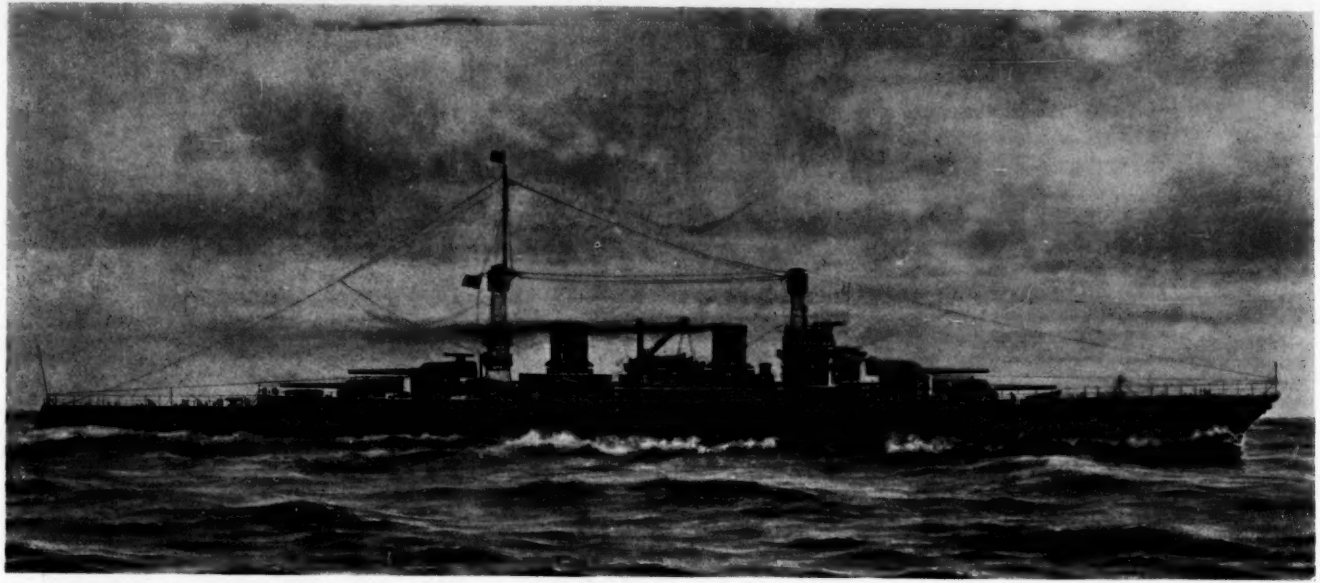
COMMANDER H. K. HEWITT, U. S. NAVY

Board of Control

REAR ADMIRAL BRADLEY A. FISKE, U. S. NAVY (*ex officio*)
REAR ADMIRAL A. H. SCALES, U. S. NAVY (*ex officio*)
CAPTAIN W. T. CLUVERIUS, U. S. NAVY
CAPTAIN A. BRONSON, U. S. NAVY
CAPTAIN T. L. JOHNSON, U. S. NAVY
CAPTAIN E. J. KING, U. S. NAVY
CAPTAIN W. G. DU BOSE, CONSTRUCTION CORPS, U. S. NAVY
COMMANDER B. C. ALLEN, U. S. NAVY
COMMANDER H. K. HEWITT, U. S. NAVY (*ex officio*)

PAST PRESIDENTS

ADMIRAL DAVID D. PORTER, U. S. NAVY, 1873
REAR ADMIRAL JOHN L. WORDEN, U. S. NAVY, 1874
REAR ADMIRAL C. R. P. RODGERS, U. S. NAVY, JAN. 1875–JAN. 1878
COMMODORE FOXHALL A. PARKER, U. S. NAVY, JAN. 1878–JAN. 1879
REAR ADMIRAL JOHN RODGERS, U. S. NAVY, JAN. 1879–JAN. 1882
REAR ADMIRAL C. R. P. RODGERS, U. S. NAVY, JAN. 1882–JAN. 1883
REAR ADMIRAL THORNTON A. JENKINS, U. S. NAVY, JAN. 1883–OCT. 1885
REAR ADMIRAL EDWARD SIMPSON, U. S. NAVY, OCT. 1885–OCT. 1887
REAR ADMIRAL STEPHEN B. LUCE, U. S. NAVY, OCT. 1887–OCT. 1898
REAR ADMIRAL WM. T. SAMPSON, U. S. NAVY, OCT. 1898–OCT. 1902
REAR ADMIRAL H. C. TAYLOR, U. S. NAVY, OCT. 1902–OCT. 1904
REAR ADMIRAL C. F. GOODRICH, U. S. NAVY, OCT. 1904–OCT. 1909
REAR ADMIRAL RICHARD WAINWRIGHT, U. S. NAVY, OCT. 1909–OCT. 1911



U. S. BATTLE CRUISER LEXINGTON AND CLASS.

U. S. Navy Official Photo.

UNITED STATES
NAVAL INSTITUTE
PROCEEDINGS

Vol. 47, No. 2 FEBRUARY, 1921 Whole No. 216

[COPYRIGHTED]
U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE WARFARE OF THE FUTURE

By Rear Admiral Bradley A. Fiske, U. S. Navy

In a recent book, "The Art of Fighting," I endeavored to show how all warfare had developed gradually from primitive modes of fighting among primeval people; that it began with the use of man's natural weapons, his arms and fists, and changed gradually in character and methods, after changes in weapons had been made.

Exactly when the most important changes were made, we have no means of knowing; because they had all been made, and were in successful operation, before it was possible to record the facts: that is, before recorded history began. Recorded history shows to us that at a period about 1500 years B. C., the development of weapons and the development of methods of warfare for utilizing them had reached a very advanced stage. At this period, the original method of fighting with the fists and arms, had been supplanted for major operations by methods (including the use of cavalry) which employed highly specialized weapons such as spears, javelins, bow and arrows, swords, crossbows, catapults, balista, war chariots and battering rams; and had been answered by the use of shields, leggings, helmets, walls, ditches, entanglements, and armor made of cloth and hides and brass and steel.

War was then conducted almost wholly on the land; but it was conducted somewhat on the sea, especially in the eastern areas of

the Mediterranean. The solid log had been gradually developed into the hollowed log, then the built canoe, then the boat pulled by oars, then the boat in which the oars were supplemented by sails, and then the armed war-galley.

Warfare had become a highly developed art in Egypt in the 15th century B. C., in the days of Thutmose III, as is proved by the accounts of his 17 campaigns in Syria, prosecuted as they clearly were, with a high order of—not only courage and skill in operation—but wisdom, energy and foresight in preparation. In the year 1479 B. C., Thutmose, in capturing Megiddo, secured 924 chariots, 2238 horses and 200 suits of armor—a clear proof (if any proof were needed) that chariots, horses and armor were then actively used in war. Two years later, he instituted a campaign in which sailors as well as soldiers participated; for he transported his army by sea to the west coast of Syria, established a base there, and marched the soldiers thence into the interior.

Which people were the first to employ boats and other floating craft for use in war is not clearly established yet; but it is well known that long before the 15th century B. C., many large vessels sailed the Persian Gulf and the Eastern Mediterranean, carrying the wares of Assyrian, Babylonian, Persian, Egyptian and Phoenician merchants; and it is also well known that the Phoenicians were at one time the most enterprising and skilful of them all. They transported the wares of the rich inland countries east of them to the islands of Greece and the mainland of Italy beyond, even to the western limit of the Mediterranean; and they brought back many kinds of raw materials, such as tin, copper, lead, etc.

That armed vessels were used for war in those far distant days, there can be no doubt whatever; for drawings of armed galleys abound in the records of those times.

From those days until the invention and utilization of the gun in Europe in the middle ages, no very great change in the methods of war on land can now be discerned; and the same remark would be true, but in a lesser degree, concerning the weapons and the methods of war upon the sea. From the days of Thutmose III in the 15th century B. C., till the introduction of the gun in the 14th century A. D., men fought with virtually the same weapons, and therefore by virtually the same methods. And while it is probably true that the weapons and the methods were better in

Alexander's time than in that of Thutmose, and still better in Caesar's time, it seems almost sure that neither were so good at any time after the Fall of Rome, until the gun came into play.

But on the sea, a considerable development had slowly taken place. The main development that one would naturally look for would be in size; and increase in size had clearly taken place. It is not plain, however, that the increase was great: and so long as oars were the motive power, great increase could not reasonably be expected, because of the greater size and complexity of the organization needed, and the greater difficulty of turning a heavy vessel quickly in the emergencies that arose in battle. So long as the comparatively restricted waters of the Mediterranean were the scene of all the sea fighting that took place, oars continued to be the motive power used in battle; sail power being employed mainly as an auxiliary, as a means of resting the rowers, and in order to undertake long voyages. Rowers pulling oars supplied the motive power even as late as the battle of Lepanto in 1571, between the Turks on one side and the Christians under Don John of Austria on the other side. Even as late as the expedition of the Spanish Armada against England in 1588, many of the Spanish ships were propelled by oars as well as sails.

Both at Lepanto and at the subsequent battle of the Spanish Armada, powder guns were used: in fact, the gun and the ship itself used as a ram were the principal weapons: though considerable effect, of the original sea-fighting kind, was accomplished in both battles, running alongside and sending soldiers on board, to fight as soldiers against the soldiers of the enemy.

This reminds us that, from time as far away as the records of fighting go, *the office of the ship has been almost wholly to transport destructive power to a place where it could be used against an enemy*. At first, and for many centuries thereafter, the destructive power was merely that wielded by soldiers; first with their arrows and javelins before the ships came into contact, then with their swords after boarding had been effected. Ramming was carried out whenever it could be accomplished; and in ramming contests between fleets, the relative skill of the seamen in the opposing fleets was put to its fullest test, and bore its fullest fruit. But even if we attach the greatest possible value to the results of ramming, we must realize that the ram rather than the ship itself was the destructive agency, and that the office of the ship was

merely to transport it and to thrust it; even as a warrior transported and thrusted his spear.

The invention of the mariner's compass, the succeeding invention of the astrolabe and quadrant, the resulting ability of seamen to push their voyages out into the stormy and broad Atlantic, the consequent discovery of the route to the south tip of Africa, of America and of the Good Hope route to India, and the circumnavigation of the globe by Magellan's ship, the *Victory,* made the Mediterranean a minor area, and necessitated the building of ships of stronger frame and longer cruising radius than had before been needed. Then there soon came into being the sailing-man-of-war, which attained the climax of its power and usefulness in the days when Nelson and his "band of brothers" shattered the sea-power of the French, and blasted the ambitions of Napoleon.

The large sailing ship, moved by the wind alone, and armed with guns on each broadside, was the highest development of armed power that could then be used upon the sea. It was superior to the oar-rowed galley in cruising distance, but inferior in quickness of maneuver. Had the gun not been invented, one can only guess whether the oar would have continued the main motive power for warships. But the gun was so superior to the sword and the arrow, that it soon became the main offensive weapon of the ship; and the power of sails to carry this weapon over great distances without pausing, resulted in the battleship of the line that ruled the seas for centuries.

But its rule was of brief duration compared with that of its immediate predecessor, the armed galley: for the galley was lord of all it surveyed for 30 centuries that we know of, while the armed sailing-ship reigned only from the closing days of the 16th century to the middle of the 19th century, a period of less than three centuries.

The sailing man-of-war supplanted the rowed armed-galley mainly *because it could transport destructive agencies more quickly over long distances;* and the steam man-of-war supplanted the sailing man-of-war for precisely the same reason.

Meanwhile, between the time of utilization of the gun and the appearance of the steamship, on the sea, a similar though smaller development had been going on, on land. History does not tell us very clearly exactly when the gun was first employed, but we know that it was not long before or after the battle of Crécy in

1346, and that one of the first effects was to remove the knight in armor from the field of war; supplementing and making sure what had already been almost effected by the long bows and arrows of the archers.

Thus the utilization of certain inventions, especially the gun, removed the armed galley from warfare on the sea and the armored knight from warfare on the land. Both the armed galley and the armored knight had been the main factors in their respective fields for more that 3000 years. Nothing could have seemed more a permanent feature in any department of life than the armed galley and the armored knight; *yet both were cast aside like worn out gloves when more effective agencies appeared.*

That this should have been the case was clearly unavoidable, and that similar changes will again occur is also unavoidable, so long as wars, or even the possibility of wars, exist upon the earth. No other issues are so important as the issues of war, no other exactions are so imperious as the exactions of war. Diplomacy, statesmanship, society, religion, business—all make their demands, and sometimes harshly: but with each some compromise may be made, and from each some concession may be wrung—but war demands the best that nations can effect, with no compromise and no concession. When a nation goes to war, it must make its supremest effort; it must not compromise with mere conservatism, or make any concession to inertia.

But while the gun made a tremendous change in warfare, both on sea and land, the steam engine made a greater change, both directly and indirectly.

On the sea, its direct effect was to make the operations of ships so sure that their times of coming and going could be predicted and arranged with confidence, and also to accelerate the passage of ships over great ocean distances. Its indirect effects were almost countless; for the reason that the invention of the steam engine brought such an impetus to the study and invention of mechanical appliances of all kinds, that men-of-war were produced of a cruising radius, a degree of impenetrability, and a quickness and sureness of maneuver that had been undreamed of; and guns to be carried by these ships were built, and projectiles to be fired from those guns were forged, which with previous methods of manufacture had been impossible. The invention and utilization of the naval telescope-sight gave an accuracy to the firing of

those guns that justified making guns even larger yet, and consequently justified the construction of ships larger yet, to carry them; while the invention of range-finders and of optical and electrical appliances of many kinds gave an added touch of accuracy and speed, and justified still further advances in the size and power of ships.

It may here be pointed out that the value to any nation of its navy depends on the power which that navy can exert; and that the value to the civilized world of navies in general depends on the power they can exert, in comparison with that exerted by the uncivilized, the semi-civilized and barbarous. It may also be pointed out that, of all the various factors by which civilization is maintained and the beneficent results of civilization are spread throughout the world, no other single factor is more important than the safety with which vessels pass over the seas on their lawful occasions; a safety which is made possible by the navies, and by the navies only.

On the land, the main direct effect on warfare of the steam engine was to increase the speed with which troops could be moved, the first instance being in our Civil War. The indirect effects were many and various, and along the same lines as in warfare on the sea, but to a much less degree. The size, power and accuracy of guns were increased, but not so much as on the sea; and so of course, were the quickness and precision of their handling. The main arm of offence, however, remained the musket of the infantryman; and although the power and general effectiveness of this weapon were increased, they could not be increased to any great degree, because the weight of the musket could not be increased beyond that which a single man could carry on long marches. Even up to and throughout the Napoleonic times, the modes of fighting by armies were not very different from those in the days of the early Egyptian kings; because the main difference was that due to the superior range and penetrability of the gun, as compared with the javelin and the arrow; while the means of transportation and communication were virtually not changed at all.

On the sea, however, the modes of fighting were so different from those of the early Egyptian days, that very few points of similarity can be found. Instead of small galleys pulled along short distances and over little waves, relatively enormous vessels

were propelled by the wind along relatively enormous distances, and over relatively enormous waves; and instead of warriors who threw javelins over only a few feet, and wielded swords at close quarters, seamen fired heavy balls of iron from cannon, over hundreds of yards and at enormous velocity.

Thus we see that the effect of the progress of invention and civilization was to advance the later and more difficult art of sea warfare in a greater degree than the older and comparatively cruder art of land warfare.

That this might have been expected is apparent; for it is a matter of common knowledge that the progress of civilization has always been to build on itself rather than on nature; that the natural arts, such as agriculture, pasturing, writing, etc., have not been so much affected by invention and civilization as have the more artificial arts and modes of living. Life in cities, for instance, has been more changed than has life on farms; and the art of printing has been more changed than has the art of writing. Even amid the artificial surroundings of ship-life, we see greater changes brought about in the methods of fire-control than in the methods of sleeping and eating, and more changes in the mechanisms in the engineer and ordnance departments than in those of the galley and the store-room.

The result has been to endow navies with more destructive power than armies, and to give them ability to transport it at higher speed and over greater distances. To this, electricity has helped enormously, by contributing a means of rapid and sure communication which ensures the co-working of many ships and their effective handling as constituent units of great fleets. To such a degree of perfection has this been carried that, on the water, destructive forces aggregating more than the destructive forces exertable by millions of soldiers can be moved as units at great speeds, and turned to the right and left and rear, with a quickness and precision that cannot be even approximated on the land.

This accomplishment, however, has been only recently achieved. It was not achieved, moreover, until the sailing warship had wholly disappeared, and been replaced by the modern battleship; and it is instructive to realize that the going of the sailing warship and the coming of the modern battleship were strenuously resisted by the majority of navy officers. The fight did not really begin

until about 1880, and it was not actually ended before 1900. I was on duty in the Bureau of Ordnance from 1883 till 1885, and afterwards in the Atlanta, our first new fighting ship, and can bear personal witness to the bitterness of the fight that was waged to prevent the coming of what were called "mechanical gun carriages" and the abolition of sails. As late as February, 1897, most of the trip from San Francisco to Yokohama made by the U. S. S. *Petrel* was made under sail as well as steam.

It would surprise many of the present generation to know how stubbornly the change from the "old navy" to the "new navy" was resisted, and how bitterly some officers now rear-admirals on the retired list fought against it. As late as December, 1885, one of these officers, later the commander-in-chief of a fleet, argued with the present writer in the ward-room of the old Brooklyn that the Brooklyn was a better man-of-war than the Atlanta.

The coming of electricity was resisted in the same way; so was the telescope sight, the range-finder, the torpedo, and in fact, nine-in-ten of the methods and appliances that have increased the effectiveness of navies, and therefore increased the influence of navy officers in the world.

That the gradual abolition of the sailing warship should have been resisted may easily be understood, however; for it was the sailing warship that had built up the great prestige of navies. It was the sailing warship that had carried the flags of the great naval nations in all the seas, and that, under the command of Drake and Raleigh and Rodney and Howe and Nelson and John Paul Jones and Decatur and nearly all the great men of naval history, had put the navy officer on a plane only a little below that held by the army officer as the decider of the destinies of nations. The sailing warship had been queen of the ocean for three centuries, and she had reigned with power and glory and success. Why dethrone her and substitute instead a dirty tank of iron, filled with coal, and vomiting black, greasy smoke over the beautiful blue ocean and the beautiful white deck?

By an easily understood action (or inaction) of the mind, we unconsciously regard the present as the end of time, and unconsciously regard the appliances of the present as finalities. Nelson could not picture any warship except the kind he knew about—and the same remark is approximately true concerning some officers of a much later day. Even after our Civil War ended, as late as

1865, despite the fact that all the battles had been fought under steam, the majority of officers favored the retention of sails and resisted the coming of steam. Yet it was under steam that Farragut had achieved his victories, and put U. S. Navy officers in the front rank among the navy officers of the world.

But if the sailing warship had a reign of three centuries as a reason for believing her a finality, how much more of a reason had there been before, for believing that the war-galley was a finality! Instead of reigning for three centuries, she had reigned for 30; and a change would mean a change from the simple, orderly and trustworthy propulsion by oars, to a complicated, far-from-orderly and far-from-trustworthy means of propulsion by sails. One could always tell how long a time would be needed to propel a ship by oars from one place to another—whereas he could only guess, if sails were used instead. We are not told how much the question was debated during the long interval of transition; but (unless human nature then was not of the same kind that pervades the world at present) there must have been bitter opposition from many officers to the change. If the gun had not been invented, and the compass, astrolabe and sextant, it is possible that the Mediterranean would still be the naval battle ground and the war-galley the ship of war. But the progress of invention and discovery gave new means of exerting warlike power to ambitious nations, and compelled their navies to adopt them.

The power of armies and navies has now reached a tremendous stage of development; but some people are declaring that the soldier with his musket and the sailor with his ship are soon to be displaced by the airman with his torpedo and his bomb. This declaration is strongly resented by soldiers and sailors who declare —in effect—that the infantryman has always been the backbone of war on land and the battleship the backbone of war on the sea. To this the counter declaration is made that the infantryman and the battleship are perfectly free to remain the lords of their respective elements, but that both are soon to be reduced to "innocuous desuetude" by the warrior of the air.

Whether this declaration is to be proved true or not, only the future can decide. But, if we take careful note of the way in which the speed, power and safety of the air warrior are being increased, and call to mind the fate of the knight in armor, and the ensuing fate of the archer and all the other specialists who wielded weapons

and appliances that have been discarded; and if we call to mind the 30 centuries that the war-galley lived and the three glorious centuries of the sailing warship, and then realize where they are now, we can at least put our minds into a receptive state, and gage the future with instructed judgment.

The airmen tell us that two soldiers can carry two muskets with a few pounds of ammunition bullets about 14 miles in a day: but that two airmen can carry a ton of TNT, 2000 miles in the same time; and they ask the nation to decide which pair of men it wishes to employ for its protection. They also say that a fleet of battleships, destroyers, train, etc., can steam—say 400 miles a day; but that 100 torpedoplanes can go a 100 miles an hour and discharge 100 torpedoes at that fleet repeatedly, from positions say one point on either bow, five miles distant where they cannot even be seen.

Of course, it is easy to question the truth of such declarations and to point out that no war has ever shown any such performances. But no war had ever shown such a performance as the gun achieved when it was brought to bear against the knight in armor. Neither had any gun ever achieved such a performance as the Prussian needle-gun achieved in the war with Austria, nor had any ship ever shown such an indifference to gun-fire as the *Monitor* showed at Newport News—an indifference to gun-fire that did in fact "revolutionize naval warfare." Nobody—not even the German Navy officers—expected the submarine to show the effectiveness it showed in the great World War; and certainly the Belgians did not expect to see the tops of their vaunted forts crumble under artillery-fire. The effectiveness of poison-gas astonished the world, and so did the speed and certainty of our rush to Europe's rescue.

"We live in an era of change" has been a standard remark for years, but a remark only, and not a realized belief. Yet it is a fact; and therefore we are foolish if we fail to realize it and make our decisions in accordance with it. In order to realize it advantageously, *we must foresee changes coming before they actually have arrived:* otherwise, we shall be like the Austrians who went down before the Prussian needle-gun at Königratz.

Because of the oft-proved value of not only being wise, but of being wise before it is too late, and because of the enormous expenditure of money and energy now being put into the development of naval aeronautics by the nation which had hitherto devoted

her main effort to the development of her floating navy, it might be well for us to consider the propriety of following in her steps. In order to clear our minds so that we may reach a wise decision, let us first realize that we have not yet reached the end of time, and that possibly the battleship is not an absolute finality. It is easy to fall into the prevailing habit of unconsciously believing that history has ended, simply because we cannot see ahead; but reason tells us clearly that history will narrate achievements, which will be accomplished long after we are dead; that history will continue to repeat itself in the main essentials of human conduct; and that in each generation, that nation will take the lead which, while giving due heed to the triumphs of the past, learns from them the most intelligently and the most quickly how to achieve the triumphs of the future.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

SUGGESTIONS FOR IMPROVING NAVY MORALE

By COMMANDER C. F. RUSSELL, U. S. Navy

Recently a young man was asked why he didn't enlist in the navy. He said: "I don't want to go into that outfit. There are too many bosses and, besides, you get your head knocked off if you don't salute." After further conversation it was found that his information had been obtained from a former service man with a fancied grievance. At different times I have had occasion to conduct similar conversations. I have found that many young men either have a bad opinion of the navy or else don't know anything about it.

Information of a favorable nature from ex-service men seems to be lacking. Yet it is believed that a great majority of the enlisted men of the navy are really fond of the service and feel that they get a square deal on board ship. The answer then is simply this. Contented men don't talk. If a man is not a knocker he keeps still. Thus a very small minority of disgruntled men are able to sway public opinion because their arguments are not refuted. Most prospective recruits are familiar with navy recruiting propaganda. But it may lack the ring of truth to them because their ex-service acquaintances have not verified the statements contained in this literature.

It is assumed that a great majority of enlisted men like the naval service, that they feel they are well cared for and are given plenty of help when they show any desire to improve themselves. As to the truth of this assumption, the reader can best judge from his own experience. From my experience, I believe the assumption to be true. The question might be asked, "Why can't the garrulously inclined be navy boosters instead of grumblers?" A professor of psychology will have to answer that. However, it is not believed that a contented man in any line of endeavor is inclined

to talk about his work. With satisfaction goes a veil of silence. Actions are said to speak louder than words, but this maxim holds only to those who can see the actions. So while the important message of a really contented navy is being sent by visual signalling, the message of discontent is being broadcasted by radio.

There are at least two ways to meet this situation. One is by converting the knockers into boosters. Another is by lifting the veil of silence from the contented. If the knockers could be converted, our problem would be solved. Past experience has proved that this conversion cannot be accomplished completely. Earnest effort will undoubtedly be fruitful in reducing the numbers of the disgruntled.

It is impossible to enumerate all of the kicks presented by the soreheads. They range all the way from finding hairs in the stew to a chronic objection to work of any kind. There is a type of man that refuses to recognize the good in anything whatsoever. He is vocally opposed to all law and order. When he can secure a small audience, he is happy, for in reality he is at heart in love with the sound of his voice and finds much personal satisfaction in being listened to. To him, what he says is unimportant, but he finds that his circle of listeners is larger if he is against the established order of things. In his way he craves publicity exactly the same as does the long-haired soap box expounder of things anarchistic.

The means best suited to discrediting and converting this type are hard to suggest. Such a man dislikes most of all to be taken as a joke, or in other words to be shown up for what he really is. On the other hand, tactful and sympathetic advice and help might convert his talent for talking into constructive instead of destructive channels.

Most men who are trouble makers, have personal grievances. They probably will complain about everything under heaven except the real cause of their discontentment. But the underlying cause is that someone senior to them has done them a fancied or real wrong. Men think that there is no way in which they can get justice in a case of this kind, that their word is no good against that of the man higher up. Few men that I have questioned have heard of such a thing as a redress of wrongs. They can't understand why they should obey the order or carry out the instruction before objecting to it. If the order is given, in what seems to them to be improper or abusive language, they think that their only way of

getting even is by taking the law into their own hands. The result is of course inevitable.

Frequent instruction in the fundamental principles of military discipline with clear explanation as to the necessity for it and the beneficial effects of it would clear up this condition. This might require some study on the part of the instructors. I am sure every one has heard discipline repeatedly defined as "An absolutely necessary thing for a military organization," or, "discipline is that (thing) without which no military organization can exist." In each case discipline is an awe inspiring and profoundly mysterious *thing*. Yet we merely use the word discipline to mean "a development of the faculties by physical, mental, and moral training." Couple that definition with well defined and thoroughly enforced law and the ground work is complete for understandable instruction on discipline.

Another line of discontent is made manifest by the obvious disinclination of men to salute their seniors. A man will sometimes deliberately turn away to avoid saluting, but just as often he will stare at the senior he is passing and still make no move to salute. In a case of this kind the senior is supposed to call the junior's attention to his failure to salute. Generally the senior cannot do this. Occasionally, however, a case is so glaring that the senior does question the meaning of the apparent slight. The junior then trumps up some excuse and feels hurt and sore and puts down the senior as a stickler for military form or something else which means the same to the man but sounds different when spoken. Action of this sort taken in public produces a bad impression on the inevitable circle of listeners.

The whole trouble here is the fact that the men are not properly instructed in the meaning of the salute. They are merely shown how to do it and they don't see any use for it except possibly as a public admission of their own subordinate position. In private life they call out greetings to friends or fellow workers whenever they come within hailing distance. Why can't they do the same by the prescribed method in the service when they pass a senior? Because they don't know that the salute is a form of greeting or salutation. They don't know that it is just as dignified to salute as it is to return a salute. It is an easy matter to make sure that every man in the navy thoroughly understands the true meaning of the salute. But

it cannot be done by publishing an order only. There must be personal instruction on this subject.

Many other instances of discontentment could be recited, the significant feature of each one being that it gives almost inexhaustible material for conversation by the loquacious sea lawyer. This is a much used term but when one stops to think about it one is struck by the fact that very seldom others than members of that society use it.

Another outstanding fact is that most cases of discontentment are due to ignorance or misunderstanding. Proper instruction will eliminate the one. Tactful discussion and explanation will correct the other.

In trying to break the silence that surrounds the contented majority, we have to use the same methods but in a different way. We use the same words set to different music. If some of the successful men of the navy could be persuaded to tell their friends on the outside of the navy's advantages and opportunities, some good could be accomplished. If all of this class of men would do this it is thought that a very favorable impression would be made on the vast reservoir of recruiting material in the country. It must be borne in mind that the young men that compose this raw material are gradually changing. They are slowly but surely getting a higher degree of education. This broadens their view on life and tends to make them more critical of any new work. They like to hear what their friends in the service think about it and if what they hear is favorable they might be inclined to look into it more thoroughly as a possible opening for themselves. Ex-service men, hearing favorable reports, would think about re-enlisting or at least would give out favorable accounts of their experiences in the navy. No man would do this unless privately urged to, and even then the feeling that he shouldn't write letters that might be published would be a further obstacle.

The navy regulations forbid the publication of any article or news item by any person in the service without the authority of the Navy Department. It is, however, an easy matter to obtain permission to publish any article that doesn't disclose military secrets or information, and that is not devoted to destructive criticism. Experience of the past has demonstrated the necessity of this official restriction on wholesale news items and letters to the public. This past experience is exactly the kind that has been discussed in

this article. Without restriction only the disgruntled would write for publication or else unconsciously the article would contain destructive criticism or information of a confidential military nature. If, in the past, there had been published more favorable articles and less of the other kind it might not have been necessary to muzzle the service. It is also thought that if the service should demonstrate by future action that for every knocker there are ten boosters for the navy, that it might be possible to modify the restrictive regulations and make it somewhat easier to present the interesting every day life and work of the navy to the public.

Besides letters which reach the interior of the country, there is the vastly easier way of reaching those close at hand by word of mouth. Every day while in port, thousands of our men go on liberty. Of these thousands nine out of every ten are potential boosters, and these men meet numbers of civilians every day. At present the one man out of every ten with the gift of gab and the poisoned tongue gets in his work while the other nine sit around, and, by their silence, apparently approve of his criticisms. This talk is adroitly disguised under a friendly or even fatherly cloak of tolerance of things that are not quite right. If closely followed his subject is found to be very much restricted because after all there are probably nine times as many things done right as there are things done wrong in the service. Right at this point if the nine listeners would thaw out and put forth the fine things about the service, their arguments would overwhelm the knocker. This is something that can easily be accomplished. It merely requires proper personal instruction to the men concerned.

Besides the letter propaganda and the personal touch with civilians that could be developed, there is one more phase of this side of the question. That is, the idea of taking steps to boost from within. As young apprentices graduate from our training schools and go on board ship they are still very far from being old timers. We all know the old song—"I knew he was a sailor for he wore a sailor's hat." The wearing of the uniform is usually proof to the civilian that a man is a sailor. But the wearing of a uniform doesn't change a man much, if any, at first unless we take into account the fact that he is usually more awkward and ill at ease than he would be in civilian clothes. The change comes from what he sees and hears. At drill and in his instruction periods he sees and hears things that eventually make him a trained and useful

cog in the human machinery of the ship. Outside of drill he sees and hears many curious things. Most of all he hears the language of men that are living an unnatural life. There are none of the restrictions of home and the refining influence of the ladies. Under such conditions the word " purity " in the phrase " The purity of our mother tongue " might be changed to " putridity."

Every person in the service is familiar with the verbal weeds that flourish and choke out the struggling crop of adjectives in the language. One is tempted to say " Oh Emphasis! What crimes are committed in thy name! " No one will tolerate any dirt or rust anywhere on board ship. It is fought tooth and nail all the time and is never allowed to get even the least foot-hold. The whole ship's company is engaged a generous portion of each day to maintain cleanliness of ship and person. We are prone to leave the fight on the dirt and filth in the men's vocabulary to an occasional chaplain. The Chaplain's Corps is not anywhere near large enough to make any impression on this problem. They need the help of every responsible man and officer in the service. Even then progress will be slow. But it is a fact that this looseness of language has a certain deteriorating effect on the morals of a man, especially the young man just starting out in the service. Now, if in addition to hearing decent language, the young man could hear the deserved praise of navy life and the opportunities before him, he would undoubtedly be started on the right track, the road to knowledge and resultant promotion. It is up to the satisfied older men of the service to accomplish this and it can be done.

Amongst the older satisfied men of the service are, of course, included the officers. A naval officer may be a rather peculiar human being, but he has in general the same characteristics as has the enlisted man. Naval officers as a rule love their profession. Take an officer away from the sea for any length of time and he will become uneasy. As time goes on he will long for his old life. He has the love of sea life bred in him. Take an officer in conversation with civilians and you will find a man extremely jealous of the honor of his service. He will stoutly defend the service from any attack or disparagement. But once you get a group of officers alone together in wardroom or elsewhere, you will almost invariably hear a long list of gloomy complaints. Talk of resigning and struggling for existence on the outside are heard. But most all of the listeners are perfectly sure that the sad faced officer con-

cerned has no more idea of resigning than he has of meeting the man in the moon. He is merely providing a form of entertainment for himself and friends. They all get a sort of solemn enjoyment out of it.

Officers generally take a keen professional interest in the enlisted men. All drills and instructions are carried out with the utmost exactness for detail and with the greatest patience. The spirit of competition is highly developed. The same interest is taken in sports and in healthful amusements. No one in civil life is anywhere near as well looked out for as is the service man when it comes to training and sports. Why not go just a step farther and say to the enlisted man "If you like the service tell your friends about it. If you don't like it let's talk it over."

Different officers use different methods in educating and training the men under their immediate command. But the ones that are most successful have as their objective the winning of the respect and confidence of the man. This cannot be done by giving privileges, being easy going, allowing the men to get into sloppy habits or otherwise trying to impress them that you are a good fellow. This method has the opposite result. The men develop a feeling of contempt instead of respect for the one employing such methods and no one will confide in a person held in contempt.

The respect and confidence of a man can best be won by firm discipline, absolute squareness in facing every problem, coupled with instant and full recognition of good and faithful service. Keep a man on his toes and give him a square deal and he will be on the alert to earn praise and promotion. Co-operation and well-directed action on the part of the officers will produce the goods.

But, first of all, let us see if we can't improve the officers in some respects so that they may set a better example and be better equipped to train the men entrusted to their care. There is room for improvement, we must admit, especially amongst the younger officers in neatness of person and in respect toward their seniors and in smartness of bearing. There is a tendency now noticeable among the junior officers to relax a little. They seem to lack the quality of alert respect in the presence of seniors. Some seem to have forgotten that it is a mark of manly and courteous respect to salute a senior. Alas! some evidently don't know how to salute. This is all a result of the war. It all can be corrected if the older

officers will but get together and see that all their junior officers are most thoroughly instructed in military bearing and courtesy.

We must bear in mind that at present a large percentage of our commissioned officers have not had the early military training that the Naval Academy graduates have. However, they are willing and anxious to learn how to become more efficient in their chosen profession. If the men are slack, the officers are entirely to blame. If the junior officers are slack it is the fault of the seniors. How easy it will be to correct all these defects. We have but to pull together.

There once was in Scotland a church located in a valley. The congregation decided, for some reason, that they wanted to move that church up on the nearby hill. So they got a great long rope and put it around the church. They put the church on rollers. They then led out the rope directly up the hill. The pastor was placed at the bitter end of the rope with a loop around his waist. All hands then manned the rope and at the word all started pulling together. At once the church began moving steadily up the hill. As they went along the pastor felt the church move more and more slowly. He resolutely set his back to the job and pulled all the harder. But in spite of all his efforts the church finally came to a complete rest. Covered with perspiration and filled with chagrin he turned his head and looked around. Consider his amazement when he discovered that not only were there no persons left on the rope but that all the congregation had climbed into the pews of the church and half of them were asleep.

Let us lend every encouragement to our superior officers to put the navy on the pinnacle of contentment and efficiency. Then let us all man the drags and pull and push and boost without let up until the navy we love is not only on the pinnacle of efficiency and contentment but is so firmly placed on the rock foundation of loyalty and co-operation that no matter what storm may beat on this our beloved service, it cannot fall because it is founded upon a rock.

[COPYRIGHTED]
U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

SQUANTUM, THE VICTORY PLANT

By CAPTAIN REGINALD R. BELKNAP, U. S. Navy

PART I

To the service at large, Squantum was first introduced by Captain Henry Williams (C. C.) writing in the April, 1920, number of the U. S. NAVAL INSTITUTE PROCEEDINGS, "A Record in Destroyer Construction," dealing mainly with the building history of the destroyer *Reid*, 59 calendar days from keel laying to delivery, tried and complete. To appreciate that achievement, the whole account should be read, for it shows a remarkable example of planning and management, but although, as a single destroyer building record, it is believed never to have been equaled, it does not stand as the only mark to Squantum's credit, nor the only ground for naval interest, historical and future.

The Squantum site in October, 1917, was a 730-acre tract, comprising 120-odd acres of solid, dry upland, the rest marshland and tidal flats, the whole lying along the Neponset River and Dorchester Bay, about 3 miles southwest from President Roads, Boston Harbor. Bleak, remote, and isolated, it yet had a not inconsiderable history. The name came from Squanto or Squante, an unusually intelligent and capable friendly Indian well known to the early settlers. Old resident neighbors tell of the fine crops grown in past years where now are the shipbuilding ways and the baseball field. On the edge of one attractive spot, looking across the Neponset River to Lawley's Yacht Building Yard, are the ruins of an old powder mill. Long a favorite resort for outing parties, a real estate boom brought to "New Squantum" a score or more summer cottagers, as well as a few substantial houses of well-to-do people, but the place lost these with its growth in popularity with an element inclined to be rough. There was a Squantum sporting club, and the ruined foundation is pointed out

of the house where John L. Sullivan lived with his trainer Muldoon, while preparing for the fight with Kilrain. Aviation began here in Grahame-White's time and was our navy's first war activity on this ground.

Between breaking ground for the new destroyer-building plant, October 6, 1917—cows still grazing on the site—and the cessation of work, February 14, 1920, a period of 28 months, 35 destroyers were built, of which 33 were delivered complete and the other two were transferred to Fore River within a month's work of completion—and this in spite of two winters of extreme severity. The first destroyer, U. S. S. *Delphy*, was launched on July 18, 1918, and on November 30 was delivered to the government. The incentive of a state of war thereafter was lacking, yet the work kept on in the same enterprising spirit as it had begun. Experience with the plant and its organization made progress more and more rapid, so that by the second anniversary, October, 1919, all 35 keels had been laid, 29 destroyers launched, and 22 delivered. The record feat in building the *Reid* was made at the peak of production, when 17 launchings, 36 builder's trials, 28 official trials, and 22 deliveries took place within six months. The average [1] building time of the destroyers here was about 7½ months, which was less than done anywhere else and in marked contrast to the pre-war average of about 18 months.

The opportunity to plan a modern installation free from the embarrassments of already existing equipment or restricted area was evidently appreciated and utilized. The Squantum plant is compact without being crowded, so arranged as to avoid crossing of lines, carrying back, or other interference or lost motion in the movement of material. Traveling cranes and tracks communicate everywhere, and every operation of hull assembly, after launching as well as before, is done under cover. What could be more complete, more secure from delays of bad weather?

Since the boilers and machinery of the Squantum destroyers were built elsewhere, the engineering side of the new plant was

[1] All 35 averaged 8 months 20 days, but long delay in receipt of material and the plant being incomplete for the first 10, to neglect those makes a fairer average, namely, 7½ months. The last 17 averaged 3½ months before launching. In its present condition the plant could reopen upon order and, barring abnormal delay in the receipt of material, deliver 16 to 20 destroyers in 12 months and one a week thereafter.

at first comparatively limited. More engineering equipment was installed as the work progressed, and it became clear that finishing, fitting, adjustments, and replacements could be done to best advantage on the ground. The plant to-day is nearly as complete in machinery division equipment as it is for hull construction, the principal lack being tools and equipment for turbine work.

Many plant extensions and other war time constructions, aggregating in cost many millions, became of no further use to the government after the Armistice and had to be dismantled or sold. At Squantum, however, the prospect of future naval usefulness was favored by two important considerations. The plant was not adaptable for mercantile ship construction, which decided the Bethlehem Shipbuilding Corporation not to absorb it, and its location had happily been so chosen as to be suitable for a torpedo vessel base.

A board of naval officers, convened early in 1919 to consider the development of the shore establishment to meet future naval requirements, recommended Squantum for a building, repair, and reserve base of large capacity for destroyers, submarines, and possibly other craft of similar dimensions, and this mission was confirmed in general terms by the Secretary of the Navy on April 2, 1920, in G. O. No. 525, which designated this plant as the "U. S. Destroyer and Submarine Base, Squantum, Massachusetts," effective upon its taking over by the navy. After the closing of work, in February, 1920, the business of assessing costs, appraising, stock taking, cleaning up and general restoration, was well enough along by June 1, 1920, for the plant to pass into naval custody on that date. For the present it is administered as an annex to the Boston Navy Yard under its own commanding officer.

Against odds Squantum made a record long to stand, of which all connected with the establishment may well be proud. The plant's locally popular name and its connections—Victory Plant, Victory Road, Victory Bridge—denote the spirit which, let us hope, may always be the characteristic tradition. Like a thoroughbred, Squantum having run one race is fit for the track again, and so ends the first chapter. The next opens with a great opportunity.

PART II

Ships, like weapons, if they are to be serviceable, must be well kept, whether in use or idle, and this applies most forcibly to the

finer mechanisms. Few will question the wisdom of giving priority to capital ships in all things—maintenance, upkeep, repairs, personnel, and training—for unless the main stem be sound and vigorous its branches cannot long endure. But though they come first they are not the only essentials, and could any demonstration be plainer than the late war, of the value of the branches towards preserving the stem? The very terms battleship, capital forces, and fighting fleet becloud the teaching of every great war, that it is the so-called secondary forces which carry on and bear the brunt of the long argument, and that, when at length there comes a test of heavy strength, the result will be much influenced by the past and present performances of the minor craft. The tendency of naval warfare seems towards increasing the proportion of the small vessels to the large, and unless their material needs be met, bitter experience is sure to follow in capital operations, through the breakdown or poor performance of flying, torpedo, escorting, patroling, or sweeping vessels slackly cared for.

It takes some time after mobilization before the crews—inevitably inexperienced—can get the many additional small vessels now required well enough in hand for reliable upkeep. Vessels taken in from outside may or may not be ready for naval activity without repairs. That is a matter beyond naval control in peace. But it would seem to be only prudent and economical to make commensurate provision for the continuous reliable upkeep of all naval craft, small as well as large, whether active or reserve. Modern mobilization is swift, especially with naval forces, and to accept or wink at any sure cause of delay is to court initial heavy loss if not defeat.

Whatever may have been the sufficiency of our dockyard facilities for our whole fleet in the first decade since the war with Spain, the dreadnaught era threw much out of balance, which is long in being restored. For ships of to-day the formerly sufficient berths, water frontage, depths, and docks have relatively shrunk. Ours was not the only navy so to suffer, as we have Lord Jellicoe's statement that British facilities too were out of adjustment. Leviathans demand large space and facilities, to meet which small needs have been crowded out, to find satisfaction elsewhere. Whether our repair and docking facilities for destroyers and submarines have kept pace with their numbers, recently much in-

creased, is a question to which all such vessels give the same answer.

That the facilities for small vessels should be equal to their needs will not be contested. If not sufficient, a number of destroyers, submarines, and others will soon become unfit for service unless extensively repaired and their cost will have been wasted or vastly increased. On the other hand, if the cost of one or two destroyers or submarines would provide facilities for keeping a large number ready for immediate and prolonged service, such outlay would indeed be well spent, yielding a large return in the serviceability of many vessels.

In the year 1907, in a round of visits preparatory to going to duty as a naval attache, I saw at the Norfolk Navy Yard an early stage of what our destroyer force at that time hoped would become before too long a reasonably well equipped base for torpedo vessels. Seagoing fashion, they were doing their best to make something out of nothing and, starting with an old pipe-bench salvaged from the scrap heap, they had made a fair show of a beginning. Commander I. V. Gillis was the presiding genius, then a lieutenant in command of the old cruiser *Atlanta,* used as a torpedo-boat tender, moored on the St. Helena side of the Elizabeth River. A very cheerful, confident, self-reliant atmosphere prevailed there. The torpedo boat people were happy to have a place they could feel was their own, where they could stretch their legs, use a few shop tools, and carry out their ship's force work without interruptions, such as the shifting of berths so frequently necessary when their lot cast them in among the big ships in the navy yard proper. Yet the outside observer could not fail to see that, except for their hopes, the establishment was meagre indeed.

From various sources it would appear that in more than one foreign navy more symmetrical provision had been made than by us for the care of small as well as large vessels, especially in regard to the kind of arrangements which our destroyer people were striving for with such persistence, namely: a place set apart where their needs had first consideration and undivided attention, where all facilities were for their use only, including separate berthing, ample and convenient storage, shops for ships' force work, barracks for crews not quartered on board, and recreation facilities for all.

No navy has kept or will keep its entire strength always in full commission, and the considerable number of torpedo vessels, as well as others, not in full commission need special provision for their upkeep. While their navy yard repairs are going on, it is comparatively unimportant whether the vessels' complements be full or much reduced, provided the repairs be done expeditiously so as not to prolong unduly the interruption of routine upkeep. Whether such repairs can be done satisfactorily along with work on other ships at navy yards, or to better advantage in a separate division of a navy yard or in a separate yard devoted to the specialties of destroyers and submarines, is not the subject of discussion here. The main consideration in this respect is that the repairs should be timely, adequate, and quickly accomplished.

During the considerable periods between navy yard overhauls, torpedo vessels which are too slimly manned to operate or which are able to operate singly in a limited way by being grouped and each in turn taking the partial crews of all in the groups, need better than improvised arrangements for their upkeep, if they are to be counted on for immediate readiness for active service. Water, steam, and light should be furnished them from an outside source, for the more the reduced crews can be relieved of auxiliary watch duty, freed from disarrangement of their routine, and allowed the use of such upkeep equipment as they do not themselves carry, the more certain of attainment will be the desired result.

The atmosphere of a large general repair yard is unfavorable for vessels in such a reserve condition. A special place apart is wanted, for which Squantum offers an exceptional opportunity. Without impairing its present facilities for building and repair or hindering the further development of the latter or the full utilization of both, if so decided, all the requirements for a reserve base for destroyers and submarines already exist in part or may be completed with small outlay—berths, shops, ships' storehouses, torpedo storage, quarters for submarine personnel, recreation spaces, good outside connections.

A great advantage of the Squantum property is that, in addition to its excellent equipment for building destroyers—easily adaptable for building fleet or smaller submarines and destroyer leaders as well, up to a length of 450 feet—other naval activities also may be placed here without interfering with full utilization of the

first mentioned or with one another. Thus, of aviation Squantum has seen more than a little, and was used for that purpose by the navy in our first few months in the war. The adjacent waters are sheltered but wide, and about 1000 feet of water front is still adaptable, so that local naval aviation could well have headquarters here. Then, Squantum has been designated as the depositary for all Atlantic Coast mine-sweeping gear, and a glance at the chart shows how favorable this situation is for a base for all mine-sweeping craft operating from Boston. The large acreage also offers ample space in a proper location for fuel storage. As a whole, there is so much area disposable that, while one or more of these three uses may come in the future, all of them together would not interfere with having the base affairs of destroyers and submarines in large number as the principal business at Squantum, for which it is best suited.

Estimates have been submitted embodying the main features common to the plans of all boards that have passed upon Squantum, which would provide first, among other things:

(a) Berthing 60-odd torpedo vessels.

(b) Dredging to a depth sufficient for the largest torpedo vessels to lie clear at lowest tide.

(c) Quarters for the complements of submarines.

The proposed beginning would utilize the existing facilities of the plant; make no expenditure on temporary structures except for necessary use pending their permanent replacement; proceed in such order as to interfere least with early beginning and future progress; avoid the probability of future changes by adhering to the broad outlines of a comprehensive plan; and as far as consistent with the foregoing, take advantage of natural features of the ground and site. Assuming the present estimates to be accepted, future improvements would simply add storehouses and enlarge the berthing and quarters capacity, since the proposed beginning, at outlay little more than the cost of one destroyer, would make the base equipment practically complete, and still of capacity to care for more vessels than could be berthed at one time.

Squantum is distant from President Roads 2½ miles by a nearly straight channel, and it lies so detached from its surroundings that undesirable haunts seem hardly likely to cluster around. The

U.S. DESTROYER
Entrance to Ft. Channel

property as it now stands divides itself naturally into five main parts:

The industrial area, *A*, is sufficient for a large expansion, such as would permit the work of building, repairing, and keeping vessels in reserve to go on simultaneously without mutual interference. The natural direction of any further expansion beyond the present Dorchester Bay water front would seem to be along Neponset River, over the area marked *B*, lying south of Victory Road. Still more land and more water front on Dorchester Bay could be made, if needed, however, by dredging and filling in to the eastward of the building slips. Thus the shop and storage growth and increase of berthing space would naturally first cover area *A* (possibly with its extension eastward), then area *B*.

On the foregoing it follows that area *C* lies clear of the natural direction of the industrial growth, yet near enough to the water front and to outside connections to be a suitable location for quarters for the personnel of submarines, and of some destroyers also when necessary.

For recreation, the area *D* lies outside the ground natural for industrial plant extension, yet central for men's quarters in area *C*, for vessels' crews on the water front, and for connections to outside. Part of this area is already prepared for baseball. It has a swimming beach, there are a few trees, the outlook is pleasing, and the spot is generally attractive, long used for outings in the past. It invites use and improvement for such a purpose.

The southernmost section, *E*, sufficiently out of the way for privacy yet near enough for easy access and being a natural building site, would be advantageous for quarters for the commanding officer and other principal officers of the base. It has near access to the main highway, Quincy Boulevard, and over a direct roadway to the plant, along the existing railway line, it would be only 1300 yards from the office building.

Thus ample space and orderly, logical arrangement seem natural here, offering unusual opportunity for material development of high efficiency and along with it due provision for the human element, now gaining in recognition of its importance for military success.

A recent visitor at Squantum, an experienced British shipbuilder, remarked, "This is a wonderful plant, the best arranged and most complete anywhere, but I find it equally remarkable that they

propose to close it." Other visitors, from shipyards on both coasts, have spoken in similar vein. Likewise naval officers are most favorably impressed. They find the plant to be of far greater magnitude and completeness than expected—" exceeding my wildest dreams," as one expressed it—and the property as a whole very desirable for naval purposes.

Thanks to completeness for its war activity, Squantum's further naval usefulness does not lie only in the distant future. Besides the building equipment, lying ready but idle, berthing and ship's force repair facilities are available for 13 to 20 destroyers and submarines.

On Tuesday, July 27, 1920, arrived the U. S. S. *Meredith,* Lieutenant F. K. O'Brien, U. S. N., commanding, the first destroyer at Squantum since it became a naval base. Next day came the *Kimberly* and after three weeks the *Maddox.* All were awaiting their turn for repairs at Boston; meantime their coming to Squantum not only relieved the water front congestion at Boston but gave the destroyers the space and freedom from interruption desired. They were not long in making themselves at home, getting their chains, floor plates, and other gear out on the dock for cleaning and airing, and arranging other ship's force work in company without fear of disturbance. Swimming and sailing were daily indulged in, the baseball field was soon in use, and although extra trolley cars were added to the schedule for the convenience of liberty men, home attractions at Squantum even at this stage proved stronger for many. From the first they liked it, thankful to be in a place where their needs had first consideration and hopeful of development of the base's possibilities—recalling that scene in Norfolk in 1907, already described, but with the important difference that the physical possibilities and the facilities already existing are here much greater.

This beginning, however welcome and timely, serves to show only more plainly that we should go on and grow. The unproductive but unavoidable expenditure for the upkeep of an almost idle plant worth $13,000,000 would become, with the small increase incident to a considerable activity, wholly productive. There is here the possibility of an invaluable military asset, in peace and war, and in the era of retrenchment now upon the country, the navy ought to shine in developing this property economically, as well as technically, organically, and administratively.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

GOOD STEERING

By LIEUT. COMMANDER A. M. R. ALLEN, U. S. Navy

A type of apparatus for studying the work of the steersman is described in the August number of the NAVAL INSTITUTE. This apparatus is very useful for experimental measurements, but is hardly applicable to the ordinary ship for everyday use. A simple method for obtaining the same result on board any of our modern battleships has often been used by the writer with excellent results.

Practically all the chart houses on the above mentioned class of ships are equipped with the Forbe's log and a gyro repeater. The log ticks at the rate of 100 per knot so that, from the speed of the ship, or the table of time intervals for different speeds furnished with the log, the time interval can be readily obtained. Use the ordinary plotting or ten square section sheets. Select one vertical line as the zero or course line. Have the assistant navigator read carefully, to the nearest one-half of a degree, the ship's head, to the right or the left of the course, each time the log ticks for a period of several minutes. Use one interval down for each tick, and one interval to the right or left for each one-half degree. Draw a smooth curve through the points so obtained, and the result will show you just how good the steersman is. From the number of sine curves per minute or longer you can get a still further comparison of the relative value of two apparently equally good steersmen, but under usual conditions, you will see at once which man is the better as the poor man's curves will not only be very irregular, but will generally show him steadying a degree or two off the course.

If you mark each sheet with the name of the man and the time, and post the sheets, you will soon get an interest aroused in this very important factor of ship control, and the resulting competition will more than pay you for your trouble.

It is essential of course that the work be done in the chart-house or central station, where the steersman does not know what is going on, and by selecting different times for your observations, he will always be on the lookout not to be caught doing poor work.

The conditions arising in fleet formation for this work are not as satisfactory as when steaming singly or in the lead, but fair results can be obtained if proper times are selected on long steady courses with a smooth sea.

A good course means such a saving in horsepower, that men should be trained for this work in small vessels, and only trained men used for this work on board battleships. The helmsman detail should be permanent and no changes made without permission from the navigator, so as to give this officer an opportunity to gradually weed out the men who in many cases never can be taught to steer properly.

The introduction of the gyro-compass has brought out many other interesting points in ship control bearing on the shaping of a good course, one of the most important being the frequent comparison of the master, repeater and magnetic compasses. The regulations now require the navigator to make these comparisons frequently, and this can best be done by having a comparison book kept on the bridge in which half hourly entries are made. Such a book is useful in many ways. First it ensures a careful attention to the comparative courses by the officer-of-the-deck, and the quartermaster; then it makes a permanent record that the above mentioned officer can refer to in case the gyro fails, enabling him to select the best course to steer until the navigator can be called or the gyro repaired, and finally it enables the navigator to check over not only the constant operation of his compasses, but to study the deviations of the magnetic compass under actual operating conditions.

Many officers and men still believe that the vibrating steering repeater is necessary and that it is impractical to use the relay for the navigational repeaters, but experience proves the contrary, and better courses can be steered and better bearings taken when the repeaters are operated through a properly adjusted relay, which entirely removes the hunt. Anyone who has watched the hunting repeater for a full two hour watch knows that it is a very severe eye strain, which is entirely eliminated when the relay is used. It will sometimes require personal demonstration that just as good

steering can be done with the relay, as with the vibrating compass, but once the steersman has become accustomed to the steady moving compass he will never want to use the other.

The application of the integrating center dial of the "Anschutz" compass to our steering repeaters will greatly improve the steering, as it will enable the steersman to see quicker which way the ship is going to swing, which is especially necessary with the long "firing interval" of the electric steering gear.

Good steering is so very important for the navigator, particularly in coasting, that if this part of his ship control organization is properly trained, and this otherwise routine work made interesting and competitive, by some such methods as those mentioned above, it will greatly assist him in this very important duty.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE FATE OF THE DREADNOUGHT

By Lieut. Commander Guysbert B. Vroom, U. S. Navy, and William Oliver Stevens

The war that has shaken so many things loose and toppled down so many venerable standards has now jolted the very foundations of our naval beliefs. On account of the naval history of that war there come now on all sides attacks on what has been since naval history began, the backbone of sea-power, the line of battleship; and these attacks are launched by men whose names carry great weight. Only recently Admiral Daveluy of the French service announced that the dreadnought "has lived." At the same time Admiral Beatty was reported to have said that "the ship of the future is the submersible battle cruiser," and that while battleships will not be superseded they "will be relegated to second place." As coming from the new First Sea Lord, the announcement suggests a revolutionary change of policy in the British Navy. A similar opinion is reflected in the "Memories" of Admiral Fisher. While he chuckles over the success of the dreadnought (which he invented) as an instrument for putting von Tirpitz's nose out of joint, he asserts that the heavily armored battleship, as designed to-day, "will be obsolete in five years." "Speed," he declares, "is the equivalent of armor." From our own navy came a newspaper article by a rear admiral, arguing that the dreadnought was doomed because of its inadequate protection, above against the plunging fire of long range guns and aircraft bombs, and below against mines and torpedoes. Finally, Sir Percy Scott has recently published his opinion in favor of building small craft instead of battleships.

It was not long ago that the *California* was launched at the Mare Island Yard, and on the same day the keel of the *Montana* was laid. Our building program calls for more dreadnoughts

whose plans have not even been drawn. But if the opinion of these authorities is to be accepted it is high time that we stopped spending from 20 to 30 millions for each one of these useless machines and devoted the money to better purpose. Can it be true that our navy is lagging behind the times in an hour of momentous change?

It is indeed true that there has been in our service, as in every other, much hard-shelled conservatism. In the early days generations of officers came and went without witnessing one significant change. Nelson's flagship, the *Victory*, which was launched in 1765, was the pride of the fleet at Trafalgar in 1805 and would have been just as serviceable if Trafalgar had been fought in 1835. It was naturally difficult for the officers of the old school to accept steam, rifled guns, torpedoes and armor, and they did so only with the greatest reluctance. But in this day one expects a ship to drop somewhat behind the times between blueprint and launching. Sensitiveness to the last word in naval development, therefore, is, as it should be, the very breath of the modern officer's nostrils. It is a curious fact that to-day these older officers, whom one would naturally expect to be conservative, are the ones who are calling for the revolution, while the majority of the younger officers at least are inclined to doubt. It is not conservatism that holds back these men who are fresh from chasing U-boats around the coasts of Ireland, but a desire to be "shown." They listen with respect to the opinion of these elders but they recognize no authority but facts.

Drawing "lessons from the war" is a game in which even the experts may go wrong. After the Civil War, for example, experts drew their lessons the world over and navies went through a period of building rams and monitors even though during the Civil War the monitor showed herself slow and unseaworthy and the rifled gun made ramming tactics exceedingly dangerous to the ship that tried them. Again, after the battle of the Yalu the success of the Japanese armored cruisers led the experts to boom this type now obsolete, although the real lesson was the ability of the Chinese battleships to stand terrible pounding and stay afloat. At this time drawing the right naval conclusions is imperative because it involves our national first line of defense. The American Navy is perfectly willing to paste the address of the junk man on every one of its battleships, if necessary, but it inclines to look sharply before it makes any extensive leap.

Let us consider first the new type suggested by the British, the "submersible battle cruiser." At the outset it is important to make a distinction between the pure submarine and the submersible. Everyone knows what a submarine is, but it is worth noting that it has a low speed and must depend on stealth to reach its position. The submersible is a vessel designed to operate on the surface at a relatively high speed and to submerge only when it has reached a favorable position for torpedo attack. Certain types of submersibles were produced during the war. For instance, the British developed behind a thick veil of secrecy, submersible monitors mounting 12-inch guns, the details of which are still hazy to the outsider. Now a submersible battle cruiser would have to be a ship mounting heavy guns, well furnished with torpedo tubes and encumbered with little or no armor because while on the surface she would lie awash, or nearly so, and would not need it. Further, the absence of armor would be an important consideration in the attainment of speed and wide cruising radius. Undoubtedly such a vessel would have important advantages. While on the surface, it would present a poor target to the enemy, it would theoretically, have a respectable surface speed and ability to keep the sea, and it could be able to deliver heavy blows with its great guns. It could also disappear beneath the sea and attack surface ships with the weapon and the tactics of the submarine. In co-operation with a surface fleet, it is easy to imagine such a vessel acting as a destroyer, making and repelling torpedo attacks and carrying out screening operations. It would be better than the destroyer in its vastly superior armament and in its power to submerge. In short such a type, if successfully developed, would combine the hard hitting power and the cruising radius of the battleship, united with the small exposure and submerging power of the submarine. Apparently this is what the British admirals have in mind, and if it can be made practicable it may indeed be the ship of the future.

At present, however, this type must overcome formidable obstacles before it can be called practicable. In the first place the anti-submarine devices that proved fatal to the U-boat in the last war would be even more fatal to a submersible battle cruiser. Granting that it took a large force of destroyers and aircraft to defeat a comparatively small number of submarines, the fact remains, nevertheless, that a large equipment of anti-submarine devices were developed late in the war which go far to curtail sub-

marine activity in the future. All these would be effective against the submersible. If operating by day, seeking to deliver a torpedo attack under water, it would have small chance of escaping detection by aircraft, destroyers and listening devices. It is easy to imagine such a vessel hounded to the death, from the moment it left the shelter of its own fleet, by a swarm of destroyers, "blimps" and planes. Escape for a huge submersible by diving would be impossible because on account of the difficulties of hull construction, which would involve much technical discussion to go into, it could not make way at a great depth as a submarine can, and it could only hope to lie on the bottom in comparatively shallow water until pursuit slackened. In that case, betrayed by escaping bubbles or oil, it would have to reckon with the depth bomb and explosive drag, with small chance of escape. Further, the development of listening gear has attained such a point that the big submersible could be heard and located accurately long before it could strike. To succeed then, this submersible must find means of defence against devices which proved fatal to the submarine and to which it would be even more sensitive than the submarine.

Another great difficulty, a mechanical one, has to do with propulsion. This has been one of the greatest handicaps in the progress of the submarine. The earlier types depended on gasoline engines and storage batteries, the former for surface and the latter for underwater propulsion. While the submarine was on the surface the gasoline engine served to charge the battery as well as to drive the screws. Both sources of power were very unsatisfactory because of the fumes from the gasoline engine and the hydrogen or chlorine gases from the batteries. In recent years the acid battery has been displaced by the alkaline type and the gasoline engine by the heavy oil. These lessened the dangers to the crew, but they effected no material mechanical improvement. There still remain the excessive weight and general unreliability that accompany all internal combustion engines.

Now a "battle cruiser" to-day—the *Renown*, for instance—means a ship of some 30,000 tons displacement, requiring about 100,000 horsepower to drive it at 30 knots. Suppose for the moment all the enormous difficulties of hull construction for a submersible of this size were overcome, the dead weight of internal combustion engines required to deliver anything approaching this power would be absolutely prohibitive. Even then, of course, the

submersible could not make a rate of speed comparable with that of the surface cruiser with the same engine power because the greater part of its hull would be under water. Whatever improvements may develop in driving power would always keep the surface craft much faster than the submersible, and speed in naval tactics is a factor that is paramount. Indeed, it was the low speed of the submarine in the last war that made it helpless to attack swift moving surface ships and rendered it a prey to the destroyer.

Experiments have been made to utilize steam for submersibles on the surface. The French Navy used it for their submarines without success for they found that it delayed their submerging. The English, however, have continued the experiment by building a submarine propelled by steam on the surface which can make a surface speed of 24 knots. But this boat is of limited cruising radius, and cannot stay submerged long because of the need of coming up to recharge batteries. If the submersible was steam-driven on the surface, that would have to be its sole motive power, because a ship of that size could have only one set of engines; what is most needed is an invention that will adapt steam to underwater propulsion, where any submersible type is still hopelessly slow. In brief, compared with surface ships the submersible is still at a heavy disadvantage in relation to speed and always will be so as long as water is harder to push out of the way than air. And compared with the pure submarine, the submersible would be much slower under water because of its top hamper and heavy guns and gun mountings.

Let us suppose that the submersible battle cruiser had managed to apply steam to underwater travel. What of its hitting power? Would it depend chiefly on its big guns or its torpedoes and how would it compare with a surface ship of equal armament? If it depends mainly on its guns it would labor under a serious handicap compared with the surface ship. In these days gunnery is almost an exact science and the target is found as the resultant of mathematical data. The surface ship with its high range-finding platforms and tops would be able to fire a ranging salvo and its spotters would be " on " before the submersible could get its guns into action at all. Under present day conditions, at least, all the advantages in controlling and co-ordinating big gun fire—the very essence of

surface fighting—lie overwhelmingly with the surface type. As for the underwater weapon, the torpedo, it has unquestionably developed greatly in the last decade. Under specially favorable circumstances (as in the twilight and mist of the battle of Jutland) it may have a highly important effect on the outcome of a fleet action. But the torpedo is not yet an instrument of precision. It is still only a secondary weapon because it requires that the firing vessel shall be able to maneuver into a favorable position and obtain precise mathematical data by observation. The uncertainty of any one of many essential factors makes the shot a hit or miss affair. If the submersible tried to reach its position for attack under water it would have to trust entirely to luck to get a hit, because it would be so slow in comparison with surface ships. Submarines were never able to hit the swift-moving vessels in any naval action in the North Sea. If it tried to operate on the surface as a destroyer, it would lack the destroyer's speed and flexibility.

So far, we have considered only the problem of a submersible battle cruiser in conflict with surface types. Of course a fight under water between two submersibles is exactly like a fight between two men in a dark room. A conflict under water that was not mere blind man's buff would depend on submarine radio direction finders, possibly assisted by aircraft. But these agencies are not yet developed to any such degree that they can be depended on for much practical value. Air craft, especially, depend on bases and cannot be expected to operate far from land or from a "mother" ship.

In sum, this submersible battle cruiser of the future must combine all the virtues of the dreadnought and the pure submarine without assuming faults that outweigh them. At present the handicaps of the proposed type seem to preponderate heavily. The fact is that this is a hybrid, a compromise type, trying to be both surface ship and submarine. In naval history, compromise types have never proved successful, and this promises to be far less so. Even Lord Fisher, who regards the dreadnought as "obsolete in five years," pins no great faith on an underwater type to take its place. "Wireless," he says, "is the weapon of the strong. So is the submarine—that is, *if they are sufficiently developed and diversified and properly applied,* but you must have multiplicity of species."

In other words, he regards the submersible types as only auxiliary to the command of the sea.[1]

So much for the "ship of the future." Not all the authorities quoted at the opening of this article are in favor of the "submersible battle cruiser," but all are agreed on the decline and fall of the dreadnought. The line of battleship, which in one form or another has been the naval unit since the days of the Minoan kings, is pronounced dead, and apparently in the British Navy arrangements are being made for the funeral. But perhaps it is yet possible to maintain of the passing of the dreadnought, as Mark Twain did about the report of his own death, that it is "greatly exaggerated."

What is the matter with the battleship? Rear Admiral Daveluy writes that "she has lived," because of these conditions in the war: she was forced by the submarine to keep mainly within defended harbors, and to take the sea with circumspection, guarded by destroyers and other light craft; she was unable to give safe conduct to merchantmen; and, finally, she was vulnerable to mine and torpedo. To these objections the American admiral adds the arguments, already noted, concerning her vulnerability to mine and torpedo underneath the surface, and to aerial attack and plunging fire above.

On the other hand, the evidence of the war seems to prove overwhelmingly that the ship of the line has remained mistress of the sea. Several, it is true, were lost by mines, and a very few by submarines, but the vast majority of the ships kept afloat and thereby held the control of the sea for the Allies. It was the difference in strength between the battleship force of Great Britain and Germany—a difference that neither mine nor torpedo was able to affect—which gave the highway of the sea to the Allied

[1] Since this article, was written, the following opinion has been published in Brassey's *Naval and Shipping Annual* by Sir George Thurston, an eminent naval architect and chief constructor for Vickers. As to the possibilities of a large submersible battleship, Sir George holds that "it is practically certain that, apart from its questionable value as an efficient fighting unit, the dimensions of an unarmored submersible with armament and speed equal to that of the modern capital ship would be such that even the most advanced naval expert would hesitate to accept the responsibility for its recommendation."—Quoted in *N. Y. Times*, Jan. 6, 1921.

cause and closed it to the German. Although the dreadnought herself was not adapted to combat the new peril of the submarine, it was the supporting power behind the destroyers that did combat it. These smaller, unprotected vessels were enabled to range the sea in pursuit of their quarry because of the protection of the Grand Fleet. The fact that this fleet spent most of its time at Scapa Flow does not mean that it was impotent. Even if there had been no submarine menace these dreadnoughts would have remained at their base most of the time watching an enemy that had to choose between inaction and accepting battle under unfavorable conditions.

It must be remembered that the war was fought under peculiar circumstances. The maritime theatre of action was largely restricted to the North Sea, a body of water small in area and shallow in depth. The fleet that commanded the sea would naturally remain most of the time in the security of its base. Submarines were unable to prevent that fleet from taking the sea for its periodical sweeps and for target practice at will. As for mines, it must be remembered that the open ocean is not susceptible of being mined as was the North Sea. In the case of adversaries separated by a whole ocean, who shall say that the battleship would be antiquated and useless? The Germans bent every energy to the task of intercepting troop convoys from this country, but all their mines and submarines availed nothing. If this was true of large groups of ships gathered haphazard and manned often by inexperienced officers, the protection of a battleship force from the submarine menace by its own screening flotillas need hardly be regarded as beyond hope!

It is worth remembering that in the Battle of Jutland not one dreadnought on either side was sunk. And after the battle of Dogger Bank it was possible to tow the disabled battle cruiser *Lion* back to port, in the face of enemy submarines, because of the effectiveness of the destroyer screen.

The argument about bombs and plunging fire depends upon the assumption that it is not feasible to protect the battleship in that quarter as well as against direct fire. Moreover the "danger area" at the long ranges involving plunging fire is extremely small; the fleet that does the best shooting and has the most powerful guns will have that advantage, as it would have in

any case. Under water, it is true, the battleship is unprotected, but as in the case of deck protection, the solution would seem to be not the discarding of the type, but the adaption of construction to cover that weakness. This has always been the story of the battleship from time immemorial; new conditions have made alterations, but the battleship has remained. Certainly the protection of the dreadnought offers no such mechanical and engineering difficulties as are confronted in the proposed "submersible battle cruiser." For instance, the "blisters" on the hulls of certain British ships, notably their monitors, proved a defence against torpedoes during the war; and the "cellular" construction of the hull of a battleship like the *Maryland* should localize the effect of any underwater explosion.

Some of the recent discussion on this subject has centered on the possibility of attacks on battleships by air craft controlling torpedoes by radio. But at present the stage reached in this form of tactics seems hardly far enough advanced to justify scrapping the battleship. The dependence of air craft on shore or on mother ships, the accuracy of control required for the success of such attacks from a safe height, and other elements in the problem, leave this form of tactics still in the experimental stage.

What, after all, does the dreadnought stand for? It is a combination of the great essentials of a naval unit—speed, protection. ability to keep the sea, and a maximum of hitting power. Nothing that the war developed has upset any of these prime factors; nothing that has been suggested to take its place offers any equivalent for this combination. Of course the phrase "ship of the future" may mean anything. The discussion here has centered on the immediate future—say the next five years at least. At any time an invention may come along that will upset all previous calculations, and he would be rash indeed who would venture to predict anything definite without great circumspection. Of the distant future it seems likely that the navy may leave the seas for the oceans of the air. Already the air has become an invaluable extension of the sea. But that day is likely to be beyond the vision of this generation. As long, however, as ships sail the surface of the waters, so long will the unchanging elements stand. Cruising radius, the ability to stand punishment, accuracy and weight of gun fire, the concentration of great offensive power on

one keel—all these things count now as they always have counted, as the things to be desired of the units of the fleet. Under changing forms and in changing proportion these things in the past have been represented by the ship of the line, or as we call it to-day, the dreadnought. The burden of proof therefore rests heavily on those who would say that this type " has lived."

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

POSITION PLOTTING BY RADIO BEARINGS

By ELMER B. COLLINS, Nautical Expert

The navigator approaching the coast after a stormy passage with unfavorable weather conditions that preclude the employment of observations of the celestial bodies, or the determination of a reliable fix by other known navigational methods, naturally experiences a gratified feeling of confidence and a minimum degree of anxiety over his responsibilities if perchance he has other auxiliary means whereby he may check on the unreliable and uncertain dead reckoning position of his vessel. The radio bearing has supplied this need to a certain extent and is the latest modern aid to the mariner in position finding, therefore, during the experimental stage in determining what reliance may be placed on it, as a helping factor, it behooves every progressive navigator to note with care and check closely his position as determined by radio bearings.

Fixing position by radio is very much similar to the well-known methods of a fix by cross bearing on near visible objects, differing mainly in the fact that the radio towers are widely separated in distance and the vessel generally much farther off shore, hence it becomes necessary when these bearings are plotted on the much distortioned Mercator Chart to take into account and determine the proper correction for the curvature of the earth.

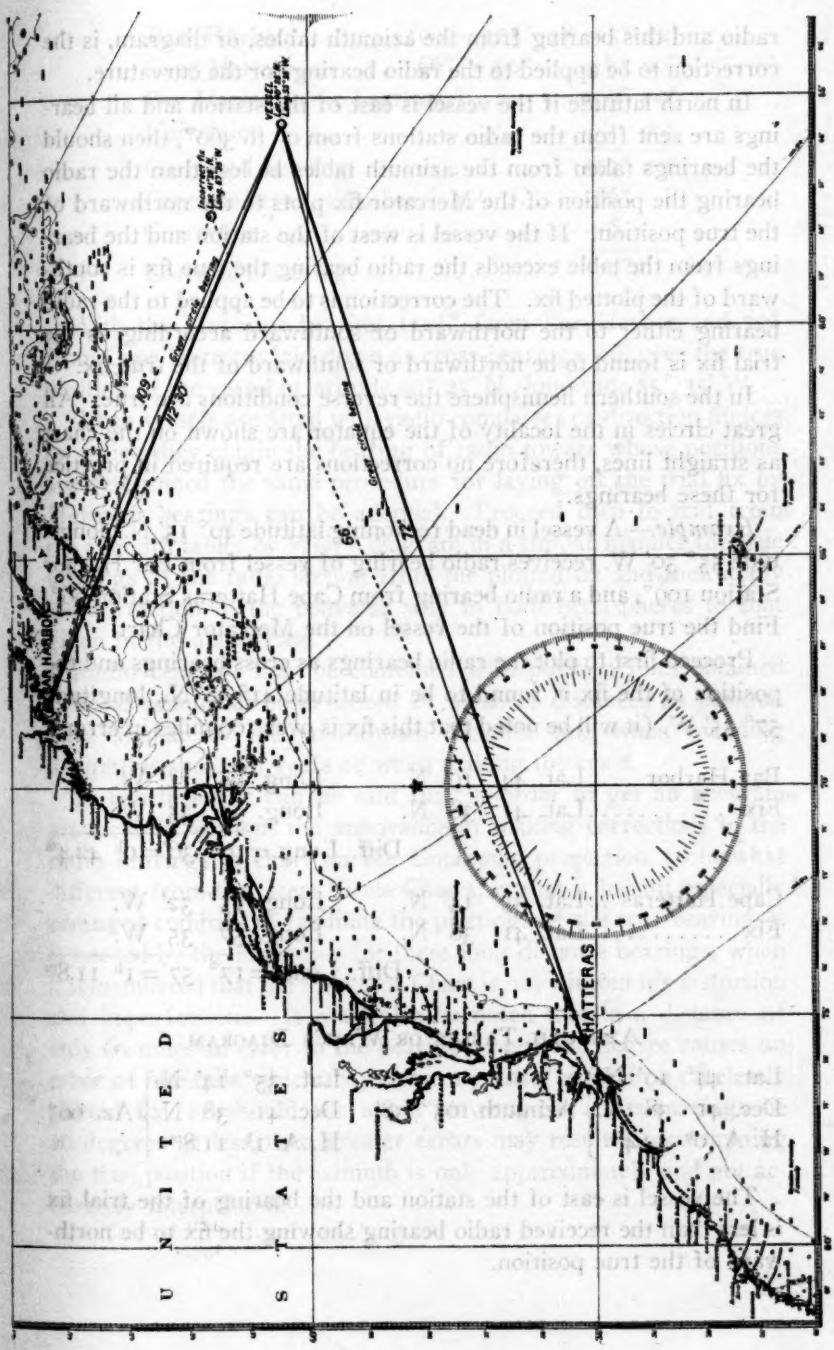
An accurate fix by radio cross bearings depends upon the degree of precision with which the direction of radio waves can be determined, and experience has already demonstrated that skillful operators with instruments in excellent working condition and good adjustment are capable of sending from their stations to any vessel at sea during daylight true bearings with a maximum error of not over two degrees. The error of waves sent at night is believed to exceed this amount although there has not been suffi-

cient available data supplied up to the present time to verify this questionable condition of affairs. The radio bearing being a great circle is laid down on the navigator's Mercator Chart as a curve concave towards the equator but curving most when bearing east or west and straightening out as the bearing changes to the north or south, so that when bearing due north or south it becomes the straight meridian line of the chart.

The meridians of the earth converging as they do at the poles and being a series of non-parallel lines cause all great circles intersecting them to cut every meridian at a different angle. On the Mercator Chart these meridians are shown as true parallel lines, therefore it follows that the air line bearing, being the angle contained by a great circle passing through the vessel, the radio station and its respective meridian cannot be shown on this particular kind of a chart by a straight line, consequently a radio bearing plotted as a Mercator bearing will cause the position or fix by cross bearings to be in many cases in error by a hundred miles or so, hence absolutely worthless to any navigator in checking the position.

A simple method is therefore proposed here that will aid and assist the navigator in using these radio bearings on a chart of this projection, placing him in the closest approximation to the vessel's true position and giving him confidence in the bearings received. Bearings may be utilized up to distances of about 1000 nautical miles off shore. In plotting these radio bearings it is suggested that the largest scale charts on board that include the radio stations and the vessel's dead reckoning position be selected and it is essential that the bearings be laid down with extreme care where the distance off shore is a large number of nautical miles.

A vessel upon receiving radio bearings from two radio stations first plots the Mercator fix as in ordinary cross bearings, paying no attention to distortion and curvature; proceed then to take off the latitude and longitude of this incorrect fix. In nine cases out of ten this plotted fix will differ from the true position. Assume that the fix is the true one and then proceed to find the true bearing of this fix from each of the two stations. Enter the azimuth tables (or Weirs diagram) with the latitude of one station as the latitude; the latitude of the plotted fix as the declination and the difference in longitude between the fix and the station converted into hours and minutes as the hour angle and take out the azimuth or true bearing of the fix. The difference between the bearing sent by


VESSEL'S
DEAD RECKONING
POSITION
112°30'
109°
66°
72°
Great circle tracks
HATTERAS
UNITED STATES

radio and this bearing from the azimuth tables, or diagram, is the correction to be applied to the radio bearing for the curvature.

In north latitude if the vessel is east of the station and all bearings are sent from the radio stations from 0° to 360°, then should the bearings taken from the azimuth tables be less than the radio bearing the position of the Mercator fix plots to the northward of the true position. If the vessel is west of the station and the bearings from the table exceeds the radio bearing the true fix is southward of the plotted fix. The correction is to be applied to the radio bearing either to the northward or southward according as the trial fix is found to be northward or southward of the true fix.

In the southern hemisphere the reverse conditions are true. All great circles in the locality of the equator are shown on the chart as straight lines, therefore no corrections are required in practice for these bearings.

Example.—A vessel in dead reckoning latitude 40° 15′ N.; longitude 55° 30′ W. receives radio bearing of vessel from Bar Harbor Station 109°, and a radio bearing from Cape Hatteras Station 66°. Find the true position of the vessel on the Mercator Chart.

Proceed first to plot the radio bearings as cross bearings and the position of the fix is found to be in latitude 41° 38′ N., longitude 57° 35′ W. (it will be noted that this fix is over 100 miles in error).

Bar Harbor	Lat.	44°	19′	N.	Long.	68°	11′ W.
Fix	Lat.	41	38	N.	Long.	57	35 W.
					Diff. Long. =	10°	36′ = 0h 42.4m

Cape Hatteras ..	Lat.	35°	14′	N.	Long.	75°	32′ W.
Fix	Lat.	41	38	N.	Long.	57	35 W.
					Diff. Long. =	17°	57′ = 1h 11.8m

AZIMUTH TABLES OR WEIR'S DIAGRAM

Lat. 44° 19′ N.			Lat. 35° 14′ N.		
Dec. 41 38 N.	Azimuth 105° 38′		Dec. 41 38 N.	Az. 60°	
H. A. 0h 42.4m			H. A. 1h 11.8m		

The vessel is east of the station and the bearing of the trial fix is less than the received radio bearing showing the fix to be northward of the true position.

Bar Harbor	109° − 105° 38′	= 3° 22′
Cape Hatteras	66° − 60°	= 6° 00′
Bar Harbor radio bearing.....		109° 00′
Correction		+3 22
Corrected bearing		112° 22′
Cape Hatteras radio bearing.....		66°
Correction		+6
Corrected bearing		72°

With the Mercator bearing 112½° from Bar Harbor and 72° from Cape Hatteras laid down as cross-bearings will give the true position of the vessel in latitude 40° 25′ N., longitude 55° 35′ W.

When vessels are fitted with radio compasses or direction finders by which they obtain the bearing of radio towers whose positions are determined the same procedure for laying off the trial fix by Mercator bearings can be adopted. Proceed then to find from the azimuth tables or Weir's diagram in a similar manner the true bearings of the radio station from the plotted fix and then apply the correction in the converse way in both hemispheres to that given in the above case.

Radio bearings may be combined with position lines obtained from astronomical observations or at short distances as position lines similar to the well-known Sumner line when avoiding dangerous shoals or reefs or when making the coast.

In conclusion it can be said that in order to get an accurate practical fix without the annoyance of making corrections to the radio bearings, a chart on the Gnomonic projection (somewhat different from the Great Circle Charts, in that it has an especially arranged compass to facilitate the plottings of the true bearings), is needed by the navigator for these long distance bearings, when it remembered that the Mercator Chart is not without it's distortion and imperfections. It must also be noted that in a distance of only 60 miles an error in the bearing of but one degree causes an error of one mile which may cause a greater error in a carelessly plotted fix, or should the angle between the cross-bearings be 20 degrees or less, then greater errors may result in determining the true position if the azimuth is only approximately and not accurately interpolated.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

UNDER-WATER TRAJECTORIES[1].

By ALAN S. HAWKESWORTH, F. R. S. A., Mathematician,
Bureau of Ordnance

As a concrete case, were a 6-inch shell—weight 105 pounds, coefficient of form .61, muzzle velocity 3000 ft./sec.—fired horizontally into a water tank 6 feet above its floor, how far will this shell travel under water before it strikes the floor of the tank? What will be the elapsed time in seconds? And what will be the residual or striking velocity? And the striking angle or angle of fall?

The volume of the shell is 471.098 cubic inches, and it thus displaces 17.012 pounds of water, weighing 62.4 pounds per cubic foot, or .036111 pounds per cubic inch. So that the reduced weight of the shell under water will be 87.988 pounds.

Next, air weighs .08071 pounds per cubic foot to water's 62.4. So that water is 773.06 times denser than air; with a correspondingly magnified resistance. Hence our modified ballistic coefficient for our under-water trajectory must be $C_1 = \frac{W_1}{(773.06)jd^2}$. Wherein W_1 is our modified under-water weight of our shell; j is

[1] Comment by the Bureau of Ordnance: Hawkesworth's article has been checked over by the Bureau and is correct so far as the validity of the assumptions and evaluations are concerned. In some cases the calculations are based upon the approximations of the ballistic functions, which seems a justifiable procedure.

The conditions chosen are such as to make the conclusions of interest mainly from a theoretical point of view, since the shell is assumed to be fired horizontally into the water, and the effect of entry into the water at the varying angles of impact found in practice is not considered. The latter condition complicates the problem of the trajectory considerably, especially at the usual angles of fall, that is, below the neighborhood of 22½ degrees.

our coefficient of form; and d^2 is the square of the shell's diameter. While 773.06 is our enlarged resistance factor.

$$62.4 = 1.795185 \qquad j = .61 = \bar{1}.785330$$
$$.08071 = \bar{2}.906972 \qquad d^2 = 36 = 1.556303$$
$$773.06 \quad \overline{2.888213} \qquad \overline{2.888213} \qquad W_1 = 87.988 = 1.944423$$
$$\overline{4.229848} \qquad \overline{4.229846}$$
$$C_1 = .00518295 = \bar{3}.714577$$

Thus our amended ballistic coefficient is $C_1 = .00518295$.

Thirdly, to determine the amended gravity coefficient g_1 for under water. Now force, in this case the shell's weight, is ever the product of mass (a fixed thing) by acceleration; which here is g_1. So that $M = \frac{W}{g} = \frac{w_1}{g_1}$ or $g_1 = \frac{w_1}{W} g$, wherein W is the absolute weight of the shell *in vacuo;* that is, its weight in air, plus the weight of the volume of air displaced by it; w_1 is its diminished weight under water; g is the gravity coefficient *in vacuo;* and g_1 is the desired new gravity coefficient for under water, which plainly must vary as the specific gravity of the sinking object, in this instance being 26.949 ft./sec.^{2}.

$$w_1 = 87.988 = 1.944413$$
$$g = 32.16 = 1.507316$$
$$\overline{3.451729}$$
$$W = 105 = 2.021189$$
$$g_1 = 26.949 \text{ ft./sec.}^2 \quad \overline{1.430540}$$

And similarly for any medium. Thus the gravity coefficient g_1 for any given object in air will be equal to the absolute coefficient g for vacuum, multiplied by the proper fraction $\frac{w_1}{W}$, whose numerator w_1 is the known weight of the given object in air, and whose denominator W is the absolute weight of said object; that is, its weight in air, plus the weight of the volume of air displaced by it.

Now time $= t = \sqrt{\frac{2S}{g}}$, wherein S is the space fallen through in feet, in this case 6 feet, so that $t = \sqrt{\frac{12}{26.949}} = .6673$ seconds.

Next, evaluating Mayevski's and Siacci's functions, for a velocity of 3000 ft./sec. the functions $S_v = 1715.7$; $T_v = .522$; $A_v = 62.10$; $I_v = .04163$.

Then for the calculated time .6673 seconds $= C_1 \sec a T_2 - C_1 \sec a T_v$.

$$\therefore \frac{.6673 + C_1 \sec a T_v}{C_1 \sec a} = T_z = \frac{.6673}{C_1} + T_v;$$ when sec a is unity.

$.6673 = \bar{1}.8243205$

$C_1 = \bar{3}.7145770$

$128.749 = 2.1097435$

$T_v = \quad .522$

$T_z = 129.271$

The velocity determined by this value for T_z is given by the equation

$$T_z = 129.271 = \frac{[4.3301086]}{V} - 15.4595.$$

$$\therefore 129.271 + 15.4595 = \frac{[4.3301086]}{V}.$$

So that

$$\log 144.7405 = 2.1665605 = 4.3301086 - \log V;$$

or

$$\log V = 4.3301086 - 2.1605605 = 2.1695481 = 147.7757 \text{ ft./sec.}$$

Wherefore this must be the velocity at the end of the .6673 seconds. The space travelled under water in the same time must be

$$\text{Space} = C_1 \{ 158436.8 - \text{antilog} (4.6923245 + \log \log 147.7757) \} - C_1 S_v.$$

$\log \log 147.7757 = \log 2.1695481 = 0.33636962$

4.69232450

$158436.8 \qquad 106830.3 = 5.02869412$

106830.3

$S_2 = 51606.5 = 4.7127045$

$S_v = \quad 1715.7 = 3.234441$

$C_1 = \bar{3}.714577$

$0.949018 \quad 8.8924$

$S_2 = 51606.5 = 4.7127045$

$C_1 = \bar{3}.7145770$

$267.474 = 2.4272815$

8.8924

$\text{Space} = 258.5815$ feet.

So that the space travelled under water in the specified .6673 seconds will be 258.5816 feet, with a residual velocity there of 147.7757 ft./sec.

By Lieutenant Schuyler's empirical formula, deduced from an experiment at the Indian Head Naval Proving Ground, the under-water travel should be 254.723 feet; his corrected and condensed formula, after allowing for an error in a coefficient K, and also for the greater density of sea water (1.026), for the distance travelled during the reduction of the initial velocity of $V_1 = 3000$ ft./sec to the residual velocity of $V = 147.7757$ ft./sec.; while $W = 105$ pounds, the weight of the shell in air, will be

$$\text{Space} = \text{antilog}\{\tfrac{1}{3}\log W + 1.615872 + \log(\log V_1 - \log v)\}$$

$W = 105 = 2.021189$

$3)\overline{0.6737297}$

1.6158720

0.1164660

$\overline{2.4060677} = 254.723$ feet.

$\log 3000 = 3.477121$

$\log 147.7757 = 2.1695481$

$0.1164660 = \overline{1.3075729}$

The angle of fall ω of the shell at the said point, or range, of 258.5816 feet, is given us by $\tan \omega = \dfrac{C_1 \sec^2 \alpha}{2}\left[I_z - \dfrac{A_z - A_v}{S_z - S_v}\right]$.

First, then, to determine A_z by the formula

$$A_z = \text{antilog}\{[9.8665032] - 2\log V\} + \text{antilog}\{\text{loglog} V + 4.3151504\} - 68192.39$$

$\log V = 2.1695481$ $\quad \text{loglog} V = 0.33636962$

2 $\qquad 4.31515040$

$\overline{4.3390962} \qquad \overline{4.65152002} =$ 44825 $\qquad 9.8665032$

$336827 \ldots\ldots\ldots\ldots\ldots 5.5274070$ $\qquad 4.3390962$

381652

68192.39

$\overline{313459.61} = A_z$ at $V = 147.7757$ ft./sec.

Secondly, similarly determine I_z by the formula

$$I_z = \text{antilog}\{5.8374246 - 2\log V\} - 0.419591.$$

5.8374246

$4.3390962 = 2\log V$

$\overline{1.4983284} = 31.5013$

0.419591

$31.081709 = I_z$ at $V = 147.7757$ ft./sec.

Hence,

$$A_z - A_v = \Delta A = 313397.51\,; \quad S_z - S_v = \Delta S = 49890.8\,;$$
$$I_z - I_v = \Delta I = 31.040079.$$

So that ω the angle of fall can be derived from

$$\tan \omega = \frac{C_1 \sec^2 a}{2}\left[I_z - \frac{A_z - A_v}{S_z - S_v}\right].$$

$A_z - A_v = \Delta A = 313397.51 = 5.49609865$
$S_z - S_v = \Delta S = 49890.8 = 4.69802040$
$0.79807825 = \frac{\Delta A}{\Delta S} =$ $I_z = 31.081709$
6.281720
$24.799989 = 1.394452$
$C_1 = \bar{3}.714577$
1.109029
$2 \quad 0.301030$
$\tan 3^\circ\ 40'\ 38''.1 = 2.807999$

The shell, then, striking the bottom of the tank this glancing blow at 3° 40′ 38″, will ricochet upwards, at the same or nearly the same angle; describe a low trajectory arc; again strike the bottom at a much increased angle and much diminished residual velocity; again ricochet and repeat the performance, until it comes to rest. And its residual velocity at the point of second ricochet will be given by the equation

$$\log V = \tfrac{1}{2}\{5.8374246 - \log (I + 0.419591)\}.$$

And the needed value here of I_z will be approximately given by

$$I_z = \frac{\sin 2a}{C_1} + I_v.$$

$\sin 2a = \sin 7^\circ\ 21'\ 16'' = \bar{1}.107237$
$C_1 \quad \bar{3}.714577$
$1.392660 \quad = 24.69800$
$I_v = 31.081709$
55.779709
$0.419591 \quad 5.8374245$
$56.199300 = \quad 1.7497311$
$2)4.0876934$
$V = 110.6233$ ft./sec. $= \quad 2.0438467$

Evaluating the new corresponding function S_z,

$$S_z = 158436.8 - \text{antilog}(4.6923243 + \log\log V).$$

$$\text{Log log } V = \log 2.0438467 = 0.310448274$$

$$\begin{array}{rr} 4.692324300 & 158426.8 \\ \hline 5.002772574 & 100640.37 \\ & \overline{S_z = \ 57796.43.} \end{array}$$

And since the space traversed equals $C_1(S_z - S_v)$,

$$\begin{array}{r} S_z = 57796.43 \\ S_v = 51606.5 \\ \hline 6190.0 = 3.791691 \\ C_1 = \bar{3}.714577 \\ \hline 1.506268 = 32.082 \text{ feet.} \end{array}$$

Yet this surely overlooks two considerations, one of which is very important. First, the glancing blow struck by the shell must certainly destroy some of its energy and velocity, and probably also lowers somewhat its angle of rebound or ricochet, both factors shortening the rebound and making it less than the calculated 32 feet.

Then, secondly and chiefly, the rotation of the shell to the right (as seen from its rear), the moment it touched and was reacted upon by the bottom of the tank, would throw it violently to the right, causing it to "corkscrew" erratically in that direction and smash into the right-hand wall of the tank perhaps 6 or 8 feet beyond the point where it scraped the tank's bottom.

To sum up, then, by simply employing the familiar formulas of Mayevski, Siacci, Ingals, and Alger, but using a modified ballistic coefficient C that is 773.06 times less than the ordinary coefficient for air, we will be easily able to calculate any under-water trajectory; while a similar correction will make available, for this purpose, the exterior ballistics methods of Moulton and of Garnier. So that, were one to draw the graphs of, say, the retardation or of the resistance, then the companion graphs in air and in water would be identical; save only that those in water would be "telescoped" down, with ordinates only $\frac{1}{773}$ times the size of those in air. Nor need we be concerned here about the breaks or "stop points" in Mayevski's functions, nor even consider the change of retardation at the critical point of the velocity of sound in the medium—

in this case in water—since the flattening of our graph is so excessive, being but $\frac{1}{925}$ of its previous air value, that any and all such influences are practically negligible.

The changes in resistance and thus in retardation, by changes in the temperature, and above all in the salinity of the water, can easily be allowed for by a corresponding change in the density divisor and diminished weight.

Or were we asked to determine the projectile's path upon entering the water, at the finish of a trajectory in air, then we but need to take the calculated residual velocity and angle of fall at the said point as our initial velocity and angle of departure for the required under-water trajectory.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

PERRY'S EXPEDITION TO JAPAN

By MARY H. KROUT

The maker of records can seldom forecast the future with much accuracy. He writes, in reality, for his own times, and cannot realize events that are destined to reshape that which he had witnessed. What is taking place in Japan to-day is proof of this statement. It is the sequel to the remarkable narrative of the young Virginian, J. W. Spalding, who accompanied Perry's expedition to Japan in 1852 and saw the first break in jealous seclusion in which that hermit nation had maintained itself. The book is still to be found in a few libraries. In his terse preface the author states that through the courtesy of Commander Sydney Smith Lee, he obtained a position as "chief clerk on his ship to accompany the expedition." This record is of value therefore, being largely that of an eye witness, without the technicalities of an official report.

Commander Matthew Calbraith Perry, son of the great naval hero, Oliver Hazard Perry, was given command of the expedition by President Millard Filmore, with the steam frigate *Mississippi* as the flagship of the squadron, which had already made a brilliant record in saving the *Cumberland* driven on a reef in the Gulf of Mexico, taken a decisive part in the Battle of Vera Cruz, and in other exploits. As has happened before and since, she was poorly equipped for her long voyage. Designed to draw 18 feet of water and to carry the capacity of 600, her guards a little above the water, she put out to sea "her decks not yet cleared, and the stores hastily put on board." Madeira was the first land sighted, after which they ran into the northeast trades and experienced the difficulties of navigating a steam frigate in high wind and heavy seas. The coal supply now began to run low and by way of saving, the engines were stopped, fires extinguished, "a sufficient number

of the paddles removed from the wheels which were lashed, the large smoke stack lowered on the hurricane deck and the ship put under sail."

The most interesting event of the outward voyage was the call at St. Helena. Officers and men went ashore, and Spalding walked the nine miles—a steep and stony climb—to Napoleon's tomb and "Longwood."

Capetown was paid a brief visit—its clouds of red dust, the low straggling houses stretched along level, uninteresting streets under the shadow of Table Mountain affording few attractions aside from the fine gardens. The polyglot population, however, of English, Dutch, Bengales, Kaffirs, Malays and Chinese interested the Americans.

The squadron also called at Colombo, St. Galle, Singapore, which were briefly inspected and finally, in cloudy, boisterous weather, at the Ladrone Islands, the squadron entered Chinese waters. Hong Kong and Shanghai gave both officers and men a little much needed change and recreation.

The manner of their reception in Japanese waters was decidedly problematical. No western ship, except those of the Dutch at long intervals and under stipulated conditions, had ever penetrated its ports.

The doubtfulness of the situation, considering the enormous population of the crowded country and their war-like character emphasized the need of what to-day has become a familiar term, "preparedness."

During the long voyage much time had been given to drills "going to quarters morning and evening for inspection; the whole ship's company, once a week beat to general quarters; magazines opened; powder boys busy passing and repassing cartridge boxes; guns cast loose and worked by their crews; boarders called away and pikemen posted to repel boarders, with marines stationed near them. Orders were given for sail-trimmers to put stoppers on such portions of the rigging as an active imagination suggested must have been shot away; all the evolutions of an actual engagement gone through."

One arrangement made at Capetown which caused much discomfort during the latter part of the voyage was thus scathingly described. There "twelve of the large-horned Cape bullocks and a number of the Cape sheep with tails wide as a dinner plate were

put on board. The stalls of the larger cattle were on the forecastle, and on the quarter deck, tied up to the halyard racks. When the ship rolled heavily the noise of these poor animals endeavoring to conform to the ship's movement, or disturbed by the men getting at the ropes which their large horns covered, and their continued tramping over the heads of those below deck was, of course, increasing the comfort of the shipboard hugely.

"Then during a rough night some steer would tumble down and dislocate his thigh, requiring the butcher's axe to dispatch him the next morning. On the port side of the quarter deck," he ruefully continues, "the bleating of the sheep from the fold made by lashing oars from the breach of one gun to another, was quite melliferous. In the necessity, had one arisen, of fighting ships," he concludes, "overboard would have to go the beef-cattle; if the ship had been required to salute a superior command met at sea orders would have been given, perhaps as follows:

"'Starboard (look out for the bull) fire. Port (you'll get kicked) fire. Starboard (don't hurt those sheep) fire.'" The Riu Kiu, or as Spalding wrote it, the Loo Choo, islands were chosen as the base of operations "on the principle of reaching the old hen by going after the chickens first. There," he said, "getting our anchorage we felt as if we had arrived at the outer door of the hermetic empire we had come so far to deal with, we then being only eight or nine days from the Bay of Yedo."

Previous to arrival a general order had been issued requiring lookouts to be kept in port, as at sea, all movements of vessels or collection of boats to be reported to the officer of the deck and by him to his superiors; sentinels armed with loaded muskets and six rounds of ball cartridge; general and decision exercises of great guns and small arms, with artillery and infantry drills, were to be prosecuted with increased diligence, while in navigating those seas still more attention was to be given to secure safety, than to accomplish quick passages.

The country about to be visited, it was also stated, was inhabited by a singular and exclusive people who for more than two centuries declined all intercourse with strangers, and to maintain their position had had recourse to measures, at variance with those of civilized nations. A paramount duty enjoined by Commodore Perry was that these prejudices should be overcome by friendly and conciliatory measures.

Anchorage was made off the city of Napa, the extreme southern end of the islands, May 26, 1853. The land, with its steep shores covered with dense verdure was a refreshing sight after the voyage along the Chinese coast under grey skies and through stormy waters. Commodore Perry had received very explicit instructions as to his personal and official attitude. He was to regard his official and national prestige upon all occasions, refusing to confer with any official of inferior rank who might be sent to him.

At Shanghai he decided to transfer to the *Susquehanna* which he found waiting there, and this ship with the *Mississippi, Plymouth* and *Saratoga* with the store-ship *Supply,* now comprised, which for that time, was an imposing squadron.

A steamship was an amazing spectacle in those waters, and with the other vessels, excited the wildest curiosity not unmixed with apprehension—the first squadron from the outside world to visit Napa. Within a very short time a Japanese officer was sent out and was directed to the flagship, orders having been given that all communications were to be made to its commanding officer. He was informed by that officer that the commander of the squadron, Commodore Perry, could not parley with a person of inferior rank. "This," Spalding observed characteristically, "was trying the dignitate early"; but, he explained, "nothing else will answer in the East."

The flag which the Chinese—and not the Japanese—as has often been claimed—called "the flower-flag," they had never seen before and were at first puzzled by it. Strict orders had also been given that neither supplies nor gifts should be accepted until the treaty which the United States sought to negotiate had been agreed to. Consequently, under the impression that the ships' crews must be in need of food, boats were sent out the next morning with supplies of animals, fowls and vegetables as presents. These, in accordance with orders, and rather pathetically, had to be declined.

Finally the regent of the prince came with his suite and was received—"with a cheap salute of three guns only." The suite were shown over the ship, "so frightened when the great pistons began to turn that they scrambled down the ladder." The officers were more dignified and showed no surprise at the marvelous sights they were seeing for the first time. Their subordinates were frank in their expression of astonishment, giggling at a looking-glass and feeling behind it; lifting a wine glass to the forehead before

drinking; imitating the ticking of a watch which amused them greatly. The coins, gold and silver, in the purser's chest which were shown them, excited little interest.

A reconnoisance of the harbor of Napa was made without interruption, but the people were anxious for the ships to leave and were disturbed by the station flags set up on shore about which they gathered. The honesty of the people was a constant surprise—a virtue that has certainly not improved by a too close contact with "the outside barbarian."

A house on shore had been asked for to be used as a hospital and for convalescents which was refused. But an officer and his men were allowed to occupy a building in the outskirts of Napa which had been a town hall to which the officers were carried in closed sedan chairs.

They, the Japanese, continued to hope for the speedy departure of the ships on the ground that the country did not produce more than enough for their own large population, and could not supply them with food. As Commodore Perry was aware that large quantities were exported, or given as tribute, he declined to accept this excuse, especially since the Americans had paid well for all that they received.

They also objected to his visiting the capital of the province to pay his respects to their prince, informing him that "they did not court the honor."

As might be supposed the English had not looked with favor upon the American expedition—an adventure which they themselves had not attempted, although a garrison was maintained at Hong Kong and there were British warships, at the time, in Chinese waters.

But the outcome of the expedition was anticipated in this comment: "Be the impulse right or wrong it exists and as it will be most surely acted upon, it must not be ignored." "The resistance of the Japanese," it was declared, "would be of the most determined character. Great bloodshed and great misfortune will follow the opening of Japan."

Not a word was said as to the real purpose of the expedition; the negotiation of a treaty of peace and amity that we might be able to protect American sailors wrecked upon the coasts of Japan, in whose behalf our request for protection had been long and stubbornly disregarded. The orders of Commodore Perry were

stringent and were strictly obeyed. There was no intrusion on the part of the Americans who confined themselves when ashore to the limits fixed by the Japanese. The native officials were not hurried or humiliated; their etiquette and customs were scrupulously respected. The only disagreement, of consequence, and that only temporary, was Commodore Perry's firm refusal to confer with a government representative of low rank, thereby discrediting himself and his country, as he knew, in the estimation of the Japanese.

After some delay, and in spite of the strong objections of the Japanese, Commodore Perry left anchorage at Napa and proceeded north to the Bay of Yedo, making thorough preparations for an attack should it be undertaken.

" As the ships approached the town of Uragawa (or Urago)," the author states, " about three o'clock a fort situated on a high hill sent up a shell high into the air, and in a little while after we heard the explosion of another. As they did not appear to be aimed at us were probably intended as signals not to come to anchor in their waters."

They were signals, for boats came out that were not seen at first, fully manned, and those at the oars in full uniform. An officer " with two swords " held up a letter and attempted to board the ship but was kept back by the sentinel. He was greatly enraged, and made a second attempt but was again prevented. Drawing and sheathing his sword he again held up his letter. A communication of the same sort had been thrown aboard the *Plymouth* warning them not to anchor, at their peril.

The ship kept on, notwithstanding this opposition, and let go their anchor within the harbor. In the evening the Lieutenant Governor of the province came out to the flagship, but was refused an audience with Commodore Perry, who, however, was represented in a conference which followed with the flag lieutenant. A cordon of Japanese boats immediately surrounded the ships for which the only explanation made was that " it was a Japanese custom." The Japanese officer was informed that " it was not an American custom, and would not be allowed and the boats must be withdrawn immediately or they would be fired on." He was also told that Commodore Perry had brought a letter from the Chief Magistrate of his country to the Emperor. An effort was made by the Japanese to effect the presentation of the letter at

Nagasaki; which was also resisted. Finally, after accepting the statement that it would require four days to send it to Yedo (Tokio) and receive a reply, this arrangement was accepted.

The Governor then took his leave, after which additional precaution was made to prevent attack during the night, should it be attempted. Meanwhile Japanese troops were collected. A well-constructed fort commanded the entrance to the harbor, the shore being protected by solid breast-works. While waiting the Emperor's reply to the President's letter, the work of putting the ships in fighting shape went steadily on—preparing thoroughly for action, should hostilities occur.

The *Mississippi* got under way and entered the straits following boats sent ahead to make soundings and to learn certainly if the capital could be reached, which was 20 miles from the first anchorage. While the Japanese continued to object, their guard boats endeavoring to prevent it, the work of sounding continued. No collision occurred, the Americans going on with deliberation and coolness.

Commodore Perry, in spite of all protests, continued to resist the orders that he was not to proceed to Yedo, though the Governor of Urago, himself, finally came on board and urged that his communication could be received only at Nagasaki. He was told by the Commodore that he had been instructed by the President to deliver the letter at Yedo and nowhere else. A compromise was finally arranged, that the Emperor's reply should be presented on shore at Urago, two days being required in which to get a proper building in readiness.

The Governor had brought to the flagship two interpreters. These men, with his Excellency, were shown about the ship. They, like the previous visitors, were close observers and "evinced more information than could have been expected, laughed and were untiring in their attention to—*Cherry brandy.*" They recognized a daguerreotype and called it by name, pointed out the larger American cities on a map and knew the boundaries of Mexico—rather singular knowledge for a hermit nation. They finally wished to know why "*Four ships* of war were necessary to deliver one letter."

The required preparations for that ceremony were promptly made and on July 14 the historic landing took place. The ships in the harbor on the great occasion were the *Susquehanna*, the *Mis-*

sissippi—both steamships, the *Plymouth* and the *Saratoga*. The boats were carefully prepared for landing, the seamen furnished with arms and ammunition; officers in undress uniform with cutlasses and revolvers. The boats were also supplied with anchors and after landing the men were ordered to haul off 50 feet from shore, and maintain a careful watch of proceedings, from that point.

The landing began at nine o'clock, the captain of the *Susquehanna*, which was the flagship, leading. With their customary taste, the Japanese had chosen a beautiful spot for the historic event, which was destined to effect far greater results for their advancement than any interests of our own. It was a secluded place on the shores of the bay, surrounded by an amphitheatre of hills, the snowy peak of Fuji Yama looming high over all. An American flag floated from the stern of each boat, and upon landing the men immediately formed into line, closely watched by the Japanese troops on duty and armed with spears and long brass-mounted muskets "with fuses ready coiled on their arms." The officers sitting on stools were armed with two swords—the badge of the samurai. A salute, 13 guns, was fired as Commodore Perry left the flagship and the bands which were with the boats played "Hail Columbia." The column of escort is thus described: "The marines in front, a stalwart sailor with a broad pennant, Commodore and staff; suite of officers; boxes containing presents, letters, etc.; two men over six feet tall each with a pike upon which American ensigns were fastened; sailors with bronzed muskets." All were in full uniform and were escorted by two Japanese officers to the building, where the ceremony took place." This too may be quoted as it was written: "The place of audience was limited in space and entirely open in the direction of the court, ornamented with gauze curtains as drapery. At the back of the room were representations of shubbery, and cranes wheeling in flight over it, while on the two remaining sides were hung large blue flags. . . . . Overhead you looked up to the thatching and each rafter was marked with Japanese characters, as if the building had been originally constructed at some other place—probably at Yedo, and sent down for erection. On the left of the room as you entered by ascending one step, was seated the chief Japanese functionary, appointed by the Emperor to receive the President's letter—the Prince of Idzoo; beside him was the prince of the Province of Iwami; behind him quite a number of

two-sworded mandarins (samurai). The chief man was attired in a maroon silk robe with an over-garment of red, blue cloth socks with places left for the great toe." The interpreter of the Prince. the narrator continues, "squatted on the floor partially facing the chief, and the Governor of Urago, on his haunches, immediately in front of him. The Dutch language was used which was translated into English by the Commodore's clerk. A conspicuous object in the room was a highly lacquered red chest resting on eight feet, the lid confined by blue cords with tassels." After ceremonious greetings had been exchanged, beautiful rosewood boxes were brought in by Commodore Perry's attendants, gold mounted, with gold lettering in German text. These were placed on the lacquered chest—translations of President Filmore's letter in Dutch and Chinese, which were opened that the Prince of Idzoo might see them, after which he in turn gave Commodore Perry his credentials from the Emperor. The President's letter began with the conventional greeting: "Great and good friend." The Emperor was informed that the message was conveyed to him by an officer of the highest rank in the American Navy, commander of the squadron now visiting his dominion. His Imperial Majesty was assured that the President had no other object in view but to propose that Japan and the United States should live in friendship and have commercial intercourse with each other. He explained that the Constitution of the United States forbade all interference with the religious or political concerns of other nations, and that Commodore Perry had been expressly forbidden by the President to abstain from every act that could possibly disturb the tranquillity of his Imperial Majesty's dominion. He was aware that the ancient law forbade all foreign trade except with the Dutch, but it was believed that a change allowing free trade between Japan and the United States would be beneficial to both. If it was thought unsafe to abrogate the ancient laws wholly, it was suggested that they be suspended for a period of five or ten years. It was also stated, with much tact, that numbers of Americans were employed in whale fishery near the shores of Japan; that in stormy weather vessels were wrecked on his Imperial Majesty's shores. In such cases, it was asked that these unfortunate people be treated with kindness until a vessel could be sent to bring them away. He had also learned that there was an abundance of coal and provisions in the empire. American vessels

crossing the Pacific Ocean burned a great deal of coal and could not bring it with them. It was desired that they be permitted to stop in Japan and supply themselves with coal, provisions and water, for which payment would be made in money, or other things that might be preferred. It was suggested that his Imperial Majesty should name a port in the southern part of the island where American ships could stop for that purpose. This letter was signed "at the City of Washington in America, the seat of government, on the thirteenth day of November, one thousand eight hundred and fifty-two," by the President, Millard Filmore.

As an evidence of his friendly intention Commodore Perry had brought but four of his smaller vessels. It was expected, however, that his Imperial Majesty would render such a return unnecessary, by acceding at once to the reasonable and pacific overtures of the President's letter. It was not surprising to learn that these communications should have been received in disappointed silence.

The Prince was somewhat reassured on being told that time for deliberation would be given, that the ships would return to China within a few days with any commands that he might have, and would not return until spring.

The President's letter was then placed in the lacquered chest, the tasseled cords tied, when the Governor of Urago rose and with a low bow signified that the audience was ended. The Americans then returned to their ships and sailed that afternoon, for the harbor of Urago, making soundings and surveys as they proceeded, to which the Japanese authorities, not unreasonably, still objected. A few presents had been exchanged, the Japanese officers refusing to part with their swords, which were splendid, well-tempered blades, or receive American swords in return.

On the 7th of August the *Mississippi* and *Susquehanna* arrived in Hong Kong after an absence of three months, other Chinese ports having been visited in the interval. The departure for Japan to complete the duty assigned them occurred on the morning of the 14th of January, 1854.

Special buildings had been again constructed for the final conference. The Japanese made one advance, agreeing to move them farther up the bay, on the shore nearer the anchorage of the American ships. This was agreed to and the site chosen was on the beach of the village of Yokohama. While the Japanese worked busily reconstructing the official buildings, the ships moved in

closer to shore and formed in a crescent, at their anchorage. During the preliminary preparations the Japanese officials who came off to the ships were hospitably received. A dinner was given on board the *Susquehanna*, now the flagship, to the Governor of Urago, at which the health of the Emperor was drunk by the Americans, the Japanese toasting the President of the United States in reply, all the officers having laid aside their swords. The visitors wrote their autographs in the Americans' books with but one refusal. This was a Prayer Book, which bore a frontispiece, an engraving of a cross. The landing was fixed for March 8, precautions being taken, as always, to guard against surprise. Commodore Perry was to be escorted by all the marines that could be spared from duty, with the bands from the *Susquehanna*, *Mississippi* and *Powhatan*. Four boats were sent from each ship carrying 40 seamen each, in addition to their proportion of marines and musicians. Half the captains were to remain on their ships, while those who went ashore were to leave a first lieutenant in command. An officer was in charge of the men from each ship, and one in charge of each boat. These officers were not to quit their divisions, or leave their boats. At 11 o'clock the line was formed and the boats pulled ashore. Commodore Perry then left the flagship, his departure announced by a salute of 17 guns. The Americans were formally received by a Japanese guard of honor, the common people kept back of ropes fastened to the surrounding trees shutting off any close approach to the buildings. The Commodore was received by the officers who had preceded him ashore, and with the escorting column, the bands playing American national airs, marched to the reception house which was close by, the Japanese Commissioners and members of the Council being in readiness to receive him. Five interpreters were present. When Commodore Perry arrived and was formally received by the Commissioners, the Japanese flag was run up on the *Powhatan*, with a salute of 21 guns, followed by a salute of 17 guns to the Japanese Commissioners, for which merited marks of respect they were very grateful.

The room, as on the first occasion, was tastefully furnished, with mats, hangings and beautifully embroidered screens. Low benches served as seats with a narrow table in front of each. The place was heated by charcoal fires in ornamental braziers placed in a row down the middle of the apartment. After they were seated,

the Japanese on the right, the Americans on the left—the place of honor—the Japanese chief interpreter for Commander Perry received a message from his prince, delivered it in Dutch, which was translated into English; "the Prince was glad to see him and hoped his health was better." A similar greeting was returned. Five persons, including the captain of the squadron, then retired with the Commodore to another room where a private audience was held. The momentous interview, destined to change the history of Japan incalculably, continued three hours, during which a reply to the President's letter was read. In this communication he was informed that the Emperor, who had been ill when Commodore Perry first visited Japan, had since died, and his successor had ascended the throne. The new ruler having much to engage his attention on his recent accession, there had been no time to attend to other matters thoroughly. Furthermore, as he was bound to obey the old laws, he could not bring about any change in them. The Russian Ambassador, it was explained, had recently arrived at Nagasaki to communicate a wish of his nation, but had left because no answer would be given any nation expressing a similar wish. They would, however, recognize its urgency, comply with the proposal of the United States Government concerning supplies of wood, water and provisions, and the saving of ships and their crews in distress. When informed which harbor his Excellency, Commodore Perry, might select, it should be prepared. It was estimated that such preparation would require about *five years!* A commencement would be made with the coal at Nagasaki by the beginning of the next Japanese year, February 10, 1855. Having no precedent in respect to coal, it was requested that his Excellency would furnish them an estimate, and, after due consideration, the request would be complied with, if not in opposition to their laws. Commodore Perry was asked "just what was meant by 'provisions' and how much coal would be required."

It was promised that anything further wanted by the ships from the products of the empire would be supplied, the prices of merchandise and articles of barter being fixed—by the chief interpreter, Monyama Yeuoske, and one other. The points settled, the treaty would be concluded and signed at the next interview. The Commissioners were ready to discuss the various points in the President's letter received the year before; to receive any further propositions from Commodore Perry. In modifying their

laws of seclusion the Emperor would rely upon the friendliness of the Americans and as such negotiations were novel to them, the Japanese, would confidently trust to his superior experience, generosity and justice. A draft treaty was given the Commissioners in English, Dutch, Chinese and Japanese, which was promised proper consideration, the Commodore being shrewdly reminded that the Japanese, unlike the Americans, could not act rapidly. This arrangement made, the Commissioners and Commodore Perry then returned, and tea and confections were served the officers of the escort.

A seaman had died on board the *Mississippi* two days before the conference and a request for a burial place was made. It was refused, but it was suggested that the body be taken to Urago, 26 miles south, and they would there send it to Nagasaki. Commodore Perry would not consent to this and the Commissioners finally permitted the burial on shore near the anchorage. It was an event which attracted thousands of spectators, and was conducted with the utmost solemnity, of which the officiating chaplain left a graphic account. The first of the service was read from the gangway of the ship, after which the body was taken ashore. In the first of two boats, both with flags at half-mast, were the chaplain in his surplice, and the captain of the marines with the guard of honor, who were received by the Governor of Urago and interpreter at the landing-place. The marines, upon landing, formed in line and received the body with presented arms. Then with muffled drums and fifes playing the dead march, the coffin borne upon the shoulders, the escort of seamen, now with arms reversed, the dead man was carried to his grave. "I saw one woman hold up her little child to see me," the chaplain wrote, "and the thought passed through my mind that if it should chance to live to maturity it would probably see many wonderful changes in Japan." A Buddhist priest in his vestments came down the steep steps of a temple in the line of march, and took his way to the burial place. Japanese officials stood close to the Americans while the committal was read and the priest placed himself near them behind his little table on which there were burning incense and a number of tapers. The interpreter explained that the priest had come to the burial "as a compliment." When the Christian service ended, the Buddhist began his, telling his beads, bowing and read-

ing his prayers, and was left there when the officers and escort returned to their ship.

The text of the treaty was under consideration for more than a month, during which the officers and men from the squadron made frequent visits ashore, sight-seeing and giving entertainments to the Japanese on board the ships. On the 13th of March valuable presents were sent ashore by the captain of the *Macedonian* and a suite of officers, for the Emperor and Empress. Among the most important of these for the Emperor were a miniature railway with steam engine, a magnetic telegraph, a printing press, a set of Audubon's "American Ornithology" splendidly bound, agricultural implements with all the modern improvements, a stove and rifles, pistols and swords. Those for the Empress included a telescope and lorgnette, a gilded toilette box, a scarlet velvet dress, a handsome set of china, a parlor stove, and clock and a *box of fancy soaps!* Considering the taste and elegance of the dress of Japanese women of the higher class, and indeed of all classes, and their custom of frequent bathing the scarlet velvet dress and box of fancy soap were somewhat open to criticism.

With the 12 articles of the treaty was a provision that there should be a perfect, permanent and universal peace between the United States on one part, and Japan on the other part, and between their people respectively, without exceptions of persons or places.

The four languages mentioned were employed in the negotiations of the treaty which was duly signed, the objectionable points apparently having been satisfactorily explained. Commodore Perry intimated, his chief business dispatched, that he would go up to Yedo, "to salute the Emperor," if the steamships could not reach the capital. This was objected to, and the Japanese were reminded that the objection should have been included in the treaty. They also demurred at the inclusion of the names "Lord Jesus Christ," as terms no doubt considered inimical to their own religion, but this objection was also disregarded. Hakadade was not to be visited until 50 days after the date of signing the treaty. The Japanese expressed anxiety as to the possible movements of the English and French, and asked Commodore Perry if he thought that they too would come when his squadron had sailed. To this he merely replied that he did not know.

In spite of the strong objection of the Japanese Commissioners which they persistently maintained, Commodore Perry would not

relinquish his determination to visit Yedo. The squadron was signaled to get under way, the *Mississippi* leading. Three of the Japanese interpreters came out to the ships immediately, greatly excited, and not without reason. The Commodore was informed that for not preventing it, or remonstrating, when the ships arrived in the Bay of Yedo they would be forced immediately to perform the harikari (disemboweling themselves with the sword) to atone for their breach of duty and to save their honor and that of their families. Commodore Perry, knowing this to be true, and not wishing to be responsible for such a tragedy, compromised by agreeing to go only within sight of the capital and then return immediately. Even this modification of his plans did not altogether allay their fears. The ships, the *Vandalia, Lexington, Chesapeake, Pawhatan* and *Mississippi,* left the Bay of Yedo on the 18th of April.

Throughout the stay of the squadron the desire of the Japanese for information was insatiable, on every imaginable subject pertaining to the ships, the United States, its laws, customs and products, and the officers were beset by questions, orally and in writing.

Notwithstanding Spalding's deep personal dislike for him, and his acrid criticisms, the great task assigned Commodore Perry was well and successfully performed, as is shown throughout the entire narrative. It resulted in radical changes in the history of Japan and in many aspects of its civilization, the main provision of the treaty standing unaltered to this day.

The work finished, the squadron returned to Chinese waters. The *Mississippi,* which had been reserved by Commander Perry as the flagship, arrived in the harbor of Hong Kong on the 29th of July and was joined by the *Susquehanna* from Nanking. The *Macedonian* with the other ships arrived shortly afterwards and all sailed thence by different routes for America, Commodore Perry receiving permission to return by a British mail steamer by the way of England. Both in England and in the United States, he was received with the distinguished honors he had earned and merited.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

AMALGAMATION

By COMMANDER N. H. GOSS, U. S. Navy

The principle is well established that a homogeneous squadron of vessels can operate more efficiently than a heterogeneous one. It would also seem then reasonable that the same principle could be applied to personnel.

There has always been, regrettably, a certain amount of so-called line and staff friction. If this could be removed by amalgamation, it would appear the part of wisdom to do it.

Certain of the staff corps are inherently different, on account of their training and duties, from the line and could never be amalgamated with it. Others have a common origin and similar early training.

In the line already we have engineers, ordnance specialists, electrical specialists and radio specialists. From this system the navy and the country behind it derive great benefit. These officers come out of the Naval Academy, go to sea, are then given special training along the lines they desire and for which they have shown special capability, and after this training is completed, continue to go to sea. They remain a part of the line. They retain the practical seagoing point of view, keep in touch with active conditions afloat, and by means of their special training are better qualified for shore duty along their special lines.

The construction corps follows this same line up to a certain point. They have a common Naval Academy training, an early sea experience, and are sent ashore for special training.

Here the homogeneity stops. They do not go to sea thereafter, do not remain in active touch with seagoing conditions, and inevitably drift away from the common general interest, towards a special or corps interest. They nominally pursue their specialty ashore, but actually, only a very small per cent of them are engaged in duties which fully utilize their specialized training, most of

them being employed in general hull division work at navy yards and inspection duty.

There is nothing in the world that takes the place of practical sea experience.

The great benefit which the navy and country derive from its sea-going engineer, ordnance and electrical specialists is not fully equalled by the results obtained from members of the construction corps. The former go to sea, retain the necessary practical and seagoing point of view, come ashore, are assigned to their specialty, and when ships come to the yards, or ship's requests come to the bureaus, they are at home at once, and in sympathy with the needs afloat because they have experienced the same needs and conditions themselves.

The construction corps on the other hand are handicapped. They do not go to sea. Their early sea training was so slight, and of such a subordinate character that they tend to lose the seagoing point of view almost entirely, and hence there arises a tendency to substitute a corps point of view instead of a common seagoing point of view.

For example, when a ship comes to the navy yard for repairs which requests give the captain and heads of departments more trouble, the engineering requests, or the C. & R. requests? Does it not often take personal interviews with the construction officer, appeals to the commandant, or maybe appeals to the chief of operations to get the C. & R. work through, while the machinery division work goes through as a matter of course?

Can it be said that our propelling machinery, our electrical equipment, our ordnance, our fire control, which are designed and controlled by seagoing officers, compare unfavorably with the hulls of our ships?

If the practice of depending on seagoing specialists for engineering, electrical and ordnance work it so successful, is it not reasonable to expect that ship design would be equally so?

Can it be said that hulls are more difficult to design than engines, turbines and guns? Can hull division work at a navy yard be more difficult or exacting than aligning engines and pumps, boring cylinders, fitting bearings, installing guns, adjusting fire control instruments?

Our propelling machinery, our armament and fire control, our radio are continually improving. Are our hulls, structural fittings,

interior fittings, boats, furnishings and general accommodations improving equally? And could they not be expected to improve more if their designers were also practical seagoing men?

Past experience has surely shown that there is the greatest reason and should be the greatest desire, to avoid even the appearance of a line and staff controversy.

All serve the same master, the people of this country. To try to avoid this is the purpose of this article.

Why should not the construction corps be amalgamated with the line, the common mother?

Why should not the construction officers receive their special training, as at present, be assigned hull division and C. & R. work when on shore, but go to sea as the other specialists do, and thereby keep in touch with seagoing conditions?

There would then be no navy versus construction corps problem, with its inherent controversies, lack of co-operation and consequent lessening of efficient results.

All would have a common interest, and it would appear that the general efficiency of the navy and its value to the country could not but be improved.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

OPERATIONS ASHORE IN THE DOMINICAN REPUBLIC

By MAJOR EDWIN N. MCCLELLAN, U. S. M. C.

The Dominican Republic was established in February, 1844, and, except for a period of about four years beginning in 1861 during which time Spain re-established her authority, the sovereignty of the Republic has been maintained.

Duarte was proclaimed President of the Republic by the North, but this was opposed by Santana, and after a struggle Santana was declared Chief of State with dictatorial powers, and in November, 1844, was elected President. He resigned on August 4, 1848, being succeeded by General Manuel Jimenez, who entered office on September 8, 1848, and resigned in May, 1849. Santana now headed the government with a title of "Libertador."

Colonel Buenaventura Baez became President on December 24, 1849, and upon the expiration of his term of office Santana was again elected, entering office on February 15, 1853. In 1854, General Manuel de Regla Mota was elected the first Vice-President. Santana retired on March 26, 1856, and Mota became President, soon after resigning and Baez, who had been elected Vice-President, became the President.

In 1858, General José Desiderio Valverde was elected President by one faction and thus there were two governments in the country. Baez gave up office on June 12, 1858, and General Santana again controlled the government, entering the office of President on January 31, 1859. For approximately four years prior to July 11, 1865, Spain asserted her sovereignty over the Dominican Republic, but on the above-mentioned date the Spanish flag was lowered for the last time in Santo Domingo. During the period in which Spain attempted to dominate the Dominicans, provisional governments were set up.

On September 14, 1863, General José Antonio Salcedo was elected President, but he was deposed in favor of General Gaspar Polanco, Salcedo being murdered. In March, 1865, General Pedro Antonio Pimentel was elected President.

In a short while General José Maria Cabral was proclaimed Protector of the Republic. Opposition soon arose against Cabral, and Baez was elected to the Presidency. An insurrection broke out on May 1, 1866, and before the end of the month Baez retired, Cabral being elected President. Cabral was deposed on January 31, 1868, and Baez on May 4, 1868, assumed charge for the fourth time. Baez bowed before a revolutionary storm that broke out in November, 1873, and capitulated on December 31, General Ignacio Maria Gonzalez becoming Provisional President early in 1874, and elected President on April 6, 1874, but resigned on February 23, 1876, as a civil war became imminent. Ulises F. Espaillat became President on April 29, 1876, but was ousted by General Gonzalez on October 5, 1876. General Buenaventura Baez became President for the fifth time when he overthrew Gonzalez in December, 1876. Baez retired on February 24, 1878.

Two governments were now set up with General Ignacio Maria Gonzalez and General Cesareo Guillermo as Presidents, but on April 13, 1878, the latter became the Provisional President of the entire country, and the former being declared constitutional President on July 6, 1878. Gonzalez abdicated on September 2, 1878, and Jacinto de Castro acted as President until September 29, 1878, when he was succeeded by a Council of Ministers headed by Guillermo, who on February 28, 1879, became the constitutional President. General Gregorio Luperon led a revolution against Guillermo, who surrendered on December 6, 1879, and Luperon acted as Provisional President until Father Fernando de Merino was elected President on September 1, 1880. General Ulises Heureaux became President and served from September 1, 1882, to September 1, 1884, being succeeded by Francisco Gregorio Billini, but the latter resigned on May 15, 1885, and was succeded by Alejandro Woss y Gil.

In July, 1886, a formidable insurrection broke out which resulted in the re-election of Heureaux as President on January 6, 1887. Heureaux entered a new term of office on February 27, 1889, again in 1893, beginning his final term on February 27, 1897. Heureaux was killed by Caceres in July, 1899, Juan Wenceslao

Figuereo, the Vice-President, succeeding him, but soon resigning as a result of a successful revolution headed by General Horacio Vasquez, and Juan Isidro Jimenez was elected President on November 20, 1899. In May, 1902, President Jimenez retired and fled to Porto Rico, Vasquez becoming Provisional President.

The next President was Alejandro Woss y Gil, at first Provisional President and inaugurated constitutional President on June 20, 1903, but soon gave way, and in November, 1903, General Carlos F. Morales assumed the Presidency. Morales was elected constitutional President on June 19, 1904, but resigned on January 12, 1906, Vice-President General Ramon Caceres assuming control. Caceres was elected constitutional President on July 1, 1908. Caceres was assassinated on Sunday, November 19, 1911, and General Eladio Victoria was selected Provisional President, entering office December 6, 1911. In a public election, Victoria was elected President in February, 1912. He resigned November 26, 1912, and Monsignor Adolfo A. Nouel entered the office of Provisional President for a period of two years on December 1, 1912. He resigned on March 31, 1913, General José Bordas Valdez being elected Provisional President for a period of one year and assuming office April 14, 1913.

A revolution immediately broke out but on the promise of a free election the insurgents laid down their arms. On the day the one-year term of President Bordas ended, April 13, 1914, another revolution started and spread rapidly to all parts of the Republic. Fighting occurred at Moca, Las Vegas, San Pedro de Macoris, San Francisco de Macoris, and Santo Domingo City. Monte Cristi and Santiago were comparatively quiet owing to the fact that they were dominated by Desiderio Arias who was against the government. The day his one-year term ended found President Bordas on top of the hill overlooking Puerto Plata with a large armed force, having arrived there with about 600 men on two Dominican cruisers, the *Independencia* and *Jacagua*. These men were landed but found Puerta Plata and the insurgents well intrenched, and a hard problem to solve. Considerable fighting occurred and many casualties were suffered on both sides.

BEGINNING OF FINAL INTERVENTION BY THE UNITED STATES

It was at this time that the beginning of the final intervention by the United States in Dominican affairs may be said to have com-

menced, for the senior naval officer present ordered all firing to cease, and when the Dominican cruisers attempted to bombard Puerto Plata the U. S. S. *Machias* trained her guns on them and their firing was promptly suspended. When the engaging force attempted to attack the town in the neighborhood of the railroad station the U. S. S. *Machias* opened fire on that section, one three-pounder shell passing through the Ferrocaril-Central Building. After that no further fighting occurred except that of a guerilla nature on the outer lines and detached posts.

DOMINICAN FORCES DISBANDED AND PRESIDENT SELECTED

On August 30, 1914, General Vidal, the leader of the revolutionists, obeyed an order of Captain Edward W. Eberle, U. S. N., the senior naval officer present in Dominican waters, to disband his forces. An American commission supported by the presence of a large naval force, including the U. S. S. *Hancock*, carrying the Fifth Regiment of Marines under Colonel Charles A. Doyen, U. S. M. C., successfully terminated the revolution.

A Provisional President, Dr. Ramon Baez, a son of former President Buenaventura Baez, was elected on August 27, 1914, and finally, on December 5, 1914, Juan Isidro Jimenez, was elected constitutional President, the election throughout the Republic being supervised by the personnel of the naval service and the Fifth Regiment of Marines. Jimenez remained in office until May 6, 1916, when he resigned, as the clouds of another revolution gathered, and the Council of Ministers took over the control of affairs.

NAVAL FORCES LAND AT SANTO DOMINGO CITY

On April 28, 1916, the Acting Secretary of the Navy informed the senior naval officer present on the U. S. S. *Dolphin* at Port-au-Prince, Haiti, that a report had been received from the American Consul at Santo Domingo City to the effect that conditions there were unsettled and that the presence of a naval vessel with a landing force would be beneficial.

At 9.30 a. m., April 30, 1916, the senior naval officer present issued orders for two companies of the expeditionary force stationed at Port-au-Prince, Haiti, to embark on the U. S. S. *Prairie*, which vessel was directed to proceed immediately to Santo Domingo City, its commanding officer being authorized to act

as senior naval officer present at Santo Domingo City upon arrival.

On May 5, 1916, two companies of marines landed from the U. S. S. *Prairie* at Santo Domingo City and occupied the American Legation, the American Consulate, and Fort San Geronimo. This force was later augmented by seven additional companies of marines.

On May 6, 1916, the senior naval officer present at Santo Domingo City reported that he considered the situation serious, that two companies of marines were guarding the American Legation, that officers and marines from the U. S. S. *Castine* were at the Haitian Legation, that the marines were holding Fort San Geronimo, that it might be necessary to bombard Santo Domingo City, and that Dominican troops had deliberately fired upon the American Legation and continued the fire although the American flag was flying in plain view of the gunners. On this date President Jimenez resigned.

REAR ADMIRAL CAPERTON ARRIVES AND DELIVERS ULTIMATUM TO REVOLUTIONISTS

The U. S. S. *Dolphin*, carrying Rear Admiral William B. Caperton, U. S. Navy, arrived at Santo Domingo City on May 12, 1916, and he assumed direct charge of the situation. About May 13, 1916, Rear Admiral Caperton reported that he had had a conference with the American Minister and four members of the Dominican Congress in which the latter stated that they desired to resume their portfolios, that the Dominican Congress desired to hold an election of a new President, and that they would support any President legally elected.

About May 14, 1916, Rear Admiral Caperton conferred with General Desiderio Arias, the leader of the revolutionists, in company with the American Minister, and informed Arias that the rebels in Santo Domingo City must be disbanded and deliver their arms to American forces by 6.00 a. m., May 15, 1916. Foreign officials were also informed that it was probable that American forces would attack Santo Domingo City at daylight, May 15, 1916.

SANTO DOMINGO CITY OCCUPIED

On May 15, 1916, United States naval forces, consisting of 375 marines and 225 bluejackets occupied Santo Domingo City,

entering at daylight and taking possession without casualties. General Arias was reported with an armed force in the vicinity of Santo Domingo City.

The U. S. S. *Panther* with a force of marines under Colonel Theodore P. Kane on board arrived at Santo Domingo City on May 22, 1916, and these marines landed about May 23, 1916, the bluejackets being returned on board ship. Fort Ozama was occupied.

About May 25, 1916, General Vidal, the rebel leader who had figured prominently in the 1914 rebellion, was reported to have departed for Azua. On the next day the senior naval officer present reported that Arias with his forces had left the vicinity of Santo Domingo City for Santiago.

Rear Admiral Caperton on May 27, 1916, reported the forces under his command distributed as follows:

Santo Domingo City: Four companies of marines and two of marine artillery. U. S. S. *Memphis* and U. S. S. *Dolphin*.

Ocoa Bay: U. S. S. *Reed* and U. S. S. *Hector*.

San Pedro de Macoris: U. S. S. *Castine*.

Romana: U. S. S. *Flusser*, with 30 bluejackets on board from the U. S. S. *Prairie*.

Sanchez: U. S. S. *Salem*, to maintain radio communication.

Puerto Plata: U. S. S. *Sacramento*, with two companies of marines.

Monte Cristi: U. S. S. *Panther* and U. S. S. *Lamson* with two companies of marines.

U. S. S. *Prairie* en route to Fort Liberte, Haiti, to return to Santo Domingo City.

Three oil-burning destroyers on North Coast.

PUERTO PLATA OCCUPIED

The situation became more critical with the increased activity of the rebels in the interior, and the dissatisfaction of the population in the coast cities. It thus became necessary for the United States to take further initiative, and on May 30, 1916, the senior naval officer present reported to the Secretary of the Navy that he had consulted with the American Minister and in an agreement with him to preserve peace and maintain constitutional government, had directed the landing of United States naval forces at Puerto Plata

and Monte Cristi. During the latter part of May, the forces in Santo Domingo were reinforced from the United States.

Accordingly on June 1, 1916, a naval battalion consisting of bluejackets and the marine detachments from the U. S. S. *Rhode Island* and U. S. S. *New Jersey*, landed under fire in open boats from the U. S. S. *Sacramento*. Fort San Felipe was captured and Puerto Plata occupied. Captain Herbert J. Hirshinger, of the marines, was killed instantly during the landing, while the enemy suffered to a greater extent in killed and wounded. Two companies from Santo Domingo City reinforced those at Puerto Plata, on June 5, 1916.

On June 8, 1916, the senior naval officer present reported that he had directed the commanding officer of the U. S. S. *Sacramento* to take charge and supervise the administration of the railroad at Puerto Plata and further reported that the rebels were preparing Santiago, in the interior, for a siege. He stated further that it was his intention to hold Santo Domingo City with the landing force of the U. S. S. *Memphis* and to send an expedition of marines to Santiago.

BATTLE OF GUAYACANES AND OCCUPATION OF SANTIAGO

In the meantime, on June 6, 1916, a large force of marines had landed at Monte Cristi; and on June 4, 1916, the Fourth Regiment of Marines proceeded from San Diego, Cal., arrived at New Orleans, La., and it and an additional company embarked on the U. S. S. *Hancock* on June 11, 1916, and disembarked at Monte Cristi on June 21, 22, 1916. Colonel Joseph H. Pendleton, U. S. Marine Corps, was placed in command of all forces operating on shore in Santo Domingo.

The plans for the pacification of Cibao Valley and the occupation of Santiago provided for two columns of marines to march in the direction of Santiago, one to proceed by railroad from Puerto Plata and the other to march from Monte Cristi, joining at Navarette. Colonel Pendleton was in command of the entire operation.

The expeditionary force from Monte Cristi under command of Colonel Pendleton, leaving that city on June 26, 1916, advanced along the highway, which was little more than a muddy trail through the jungle of cactus and thorny brush. On June 26, 1916, a water detail was attacked at Lagunas and one marine was

wounded by the enemy. On the next day the enemy was encountered at Trencheras and one marine was killed and five wounded. On June 28 the column was again fired on several times, one marine being wounded, and on the following day small bands of the Dominicans were driven off. On June 30 the column encountered brisk fire from the enemy at Dona Antonio Alta, which was captured, one marine being mortally wounded. The enemy was also routed at Hautillo Palmas on this date. The decisive engagement of the advance took place on July 3, 1916, at Guayacanes, near Esperanza, where the marines, after a stubborn fight, carried a strongly intrenched position defended by a large force of insurgents. One marine was killed, and one officer (Captain Russell B. Putnam) and nine marines were wounded, while the enemy's losses were very heavy. First Sergeant Roswell Winans and Corporal Joseph A. Glowin were awarded medals of honor for extraordinary heroism during this fighting. Navarette was reached on July 4, 1916.

Major Hiram I. Bearss assumed command of the Puerto Plata column on June 28, and with one company proceeded immediately to Lajas, to which place the remainder of his force had already advanced, having left Puerto Plata two days before under Captain Eugene P. Fortson. The railroad was in poor condition, bridges had been destroyed, and the mountainous terrain made progress difficult and slow. On June 29, 1916, the column attacked the enemy who were in a strong position at Alta Mira. After an engagement lasting about half an hour in which the infantry and a three-inch gun were engaged, the rebels were routed. During this skirmish Second Lieutenant Douglas B. Roben and one trumpeter were wounded. After a short advance the enemy were discovered in a strong position near a tunnel 300 yards in length. Under the fire of the three-inch gun the infantry advanced, dispersing the armed natives, and dashed through the tunnel. Upon emerging from the tunnel the marines discovered the enemy retreating at full speed towards Santiago. After making extensive repairs to the railroad and to a bridge, this column joined the main column at Navarette on July 4, 1916.

Colonel Pendleton met the Peace Commissioners from Santiago on July 5, 1916, who agreed to a peaceful entry into the city. The outskirts of Santiago were reached early on July 6, 1916, and the

city entered and Fortaleza de San Luis occupied about 3.30 p. m. the same day.

All the insurgent Dominicans eventually dispersed or surrendered, and General Desiderio Arias, the chief leader, himself submitted to American control, which became absolute throughout the Republic.

PLACED UNDER MILITARY ADMINISTRATION OF UNITED STATES

The period of reconstruction then commenced. Detachments of marines were scattered throughout the Republic to preserve order and enforce the law. Bandits were relentlessly pursued and their organized bands broken up.

On July 18, 1916, Rear Admiral Charles F. Pond relieved Rear Admiral William B. Caperton.

The Dominican Congress, on July 25, 1916, elected Dr. Francisco Henriquez Carvajal as temporary President for a period of six months, with the condition that he would not seek re-election at the general elections. As the term for which Henriquez had been elected drew to a close it became evident that he intended to run as a candidate for re-election at the general elections, and this precipitated a crisis.

On November 29, 1916, Captain (now Rear Admiral) Harry S. Knapp, who had relieved Rear Admiral Pond on November 22, 1916, issued a proclamation, declaring the Dominican Republic under the military administration of the United States. This proclamation stated in part that the purpose of the occupation was to restore good government, peace, and prosperity to the Dominicans and that "The military occupation is undertaken with no immediate or ulterior object of destroying the sovereignty of the Dominican Republic, but, on the contrary, is designed to give aid to that country in returning to a condition of internal order that will enable it to observe . . . . the obligations resting upon it as one of the family of nations." The military government took over the entire Republic and all its functions, with practically no opposition. President Henriquez, now the ex-President, left Santo Domingo early in December, 1916, for Cuba.

The military government proceeded to organize the finances, to pay arrears in salaries, to subdue several bandits who held back in declaring their allegiance, to confiscate all arms, to construct

public works, particularly roads, to organize a police force, and to improve the country generally. The heads of the executive departments under this form of government are officers of the navy and marine corps. Rear Admiral Harry S. Knapp, was appointed the first governor. Detachments of marines took over all military posts throughout the Republic.

THE GUARDIA NACIONAL DOMINICANA

By an order of the governor dated April 7, 1917, a sum of money was set aside for the organization of a constabulary force to be called the *Guardia Nacional Dominicana*, to take the place of the Dominican army, navy, and police. The organization of this force was promptly accomplished, and the *Guardia Republicana* was soon absorbed. The act of February 11, 1918, was passed by the United States Congress empowering officers and enlisted men of the United States Navy and Marine Corps to serve under the Dominican Republic and also to receive compensation and emoluments from that government. This act authorized the employment of the personnel of the navy and marine corps with the Dominican Government, similar, in general terms, to the conditions outlined in the act of Congress permitting such officers and men to accept employment under the Government of the Republic of Haiti.

Rear Admiral Thomas R. Snowden relieved Rear Admiral Knapp as governor of the Dominican Republic on February 25, 1919.

IMPORTANT MILITARY EVENTS

The principal military events occurring in the Dominican Republic since the important operations ending with the occupation of Santiago, have been: the capture of Juan Calcano at Higuey on August 24, 1916; the capture of Ramon Batista at Duarte, on October 24, 1916, in accomplishing which, Captain William W. Low and Sergeant Frank L. Atwood were killed, and First Lieutenant Victor I. Morrison, injured; capture of the Fortaleza at San Francisco de Macoris on November 29, 1916, made necessary by the opposition of Governor Perez of that place to the military administration by the United States, in which operation eight marines were wounded, and First Lieutenant Ernest C. Williams, was awarded a medal of honor for extraordinary heroism; the skirmish between followers of ex-Governor Perez and a detach-

ment of marines early on December 4, 1916, about six miles from San Francisco de Macoris, in which the Dominicans were dispersed, but Captain John A. Hughes, of the marines, was severely wounded in the leg; the killing of Second Lieutenant James K. Bolton, and wounding of Captain John R. Henley, at San Pedro de Macoris, on January 10, 1917; an engagement at Porvenir, near San Pedro de Macoris, on January 20, 1917, in which one marine was killed and one wounded; the capture of Chacha on January 23, 1917; the seven-hour engagement of a large force of marines and guardias with Dominicans at Las Canitas, on April 7, 1917, three marines being wounded; the surrender of Vicente Evangelista, *alias* Vicentico, at Seibo, on July 3, 1917; the destruction of Olivorio's stronghold in Mount Colorao on January 19, 1918; the engagement on August 13, 1918, of a marine patrol with the enemy near Hato Mayor, in which three marines were killed and one wounded; the operations of marine aviators against bandits near Mata de la Palma, on July 23, 1919, and at Majia and Sierra de Agua, on August 4, 1919; the killing of Second Lieutenant Stephen A. Norwood, near Le Tumbe on the Haitian border, on August 9, 1919; and the killing of Second Lieutenant Richard G. Howard from ambush on August 9, 1919, at Yuma.

MANY SKIRMISHES; CASUALTIES

There have been a great many skirmishes and contacts with Dominicans which have not been officially reported, but the records of the naval service disclose that during the period June 1, 1916, to August 9, 1919, there have been at least 116 distinct and actual skirmishes between the marines and Dominicans in the various parts of the Republic.

Five officers have been killed in action or died of wounds received in action with the Dominicans, and seven officers have been wounded in action, during this period. Nine enlisted men have been killed in action or died of wounds received in action and 34 have been wounded in action. This makes a total number of 55 battle casualties, and for the sake of clarity it is stated that this number does not include deaths or wounds resulting from accident and disease.

DISCUSSION

Promotion in the Navy

(See Page 7, Whole No. 215)

Captain J. S. Taylor (Medical Corps), U. S. Navy.—Lieut. Commander Vossler's able paper commands universal attention. To combine the three methods of promotion is perfectly feasible. At the first reading I thought it supplied the solution for the whole matter; at the third I realized that to combine the various systems might result, not in neutralizing the inherent defects of each, but in giving us instead three sources of possible errors due to the almost ineradicable element of human weakness. Is it not true that almost any scheme would be satisfactory if it could be operated with absolute fearlessness, by people fully informed and free from personal bias?

The statutory boards for promotion by seniority were intended to promote only the fully deserving. That is undoubtedly what the law contemplated. If they had maintained a higher standard and had made more comprehensive estimates of fitness there would have been no need for plucking boards except to *accelerate* elimination of the undesirable. Was not the plucking system, ostensibly to increase the flow of promotion, an outgrowth of the shortcomings of the examining boards? Seniority was intended to furnish the *opportunity* not the *assurance* of promotion. If there had been real uncertainty, real uneasiness about ability to qualify under the old system would it have fostered "perfunctory and indifferent performance of duty" and offered "no greater reward to efficiency than to inefficiency"?

By a plucking board we stultify ourselves. We admit that our examinations are a form: that "once in the service always in the service" unless some gross misdemeanor disqualifies. If from lieutenant to rear admiral every examination jeopardized our hold on a life job there would be inducements to endeavor, corresponding to the desperate competition that compels people in civil life to "deliver the goods." The law contemplated that boards of officers and gentlemen under oath to determine physical, moral and professional attainments would determine both fitness and unfitness and require no other board to come along and "mop up" for it.

That is the way it looks to the outsider and we must consider the outsider not only because he makes the law and holds the purse strings but because we are his trusted agents. We have other duties to the country besides defending it against the enemy of the moment. If we are to constantly prepare ourselves and our successors to display self-sacrifice and devotion so as to be victorious in every form of peril that assails our

country we must maintain for ourselves and the country the highest standard of honor and integrity. Promotion by seniority, as we used to have it, did not come up to specification. Men were promoted that should not have been promoted. There were two reasons. Sometimes we were in doubt about the justice of throwing a man out into the cold world. We were always loath to do it. We did not do it. The task was too hard. Selection came in and now among the men who are not selected there are certainly a few who have no reason to growl because, instead of being selected up, they should have been selected out, only we don't tell them so. The honest, straightforward thing is to select out when incompetency presents itself for promotion by seniority. But to relegate old shipmates and friends to penury and starvation is flatly beyond us. This is the essential weakness of promotion by seniority. Another and very real obstacle to efficient working of the seniority system lies outside the service. We know full well that if examining boards made wholesale eliminations there would be a howl from the public and enormous pressure would be brought to bear to obtain re-examination and reinstatement, etc. This seems to me a less obvious but most valid objection to attempting to bolster up the seniority system which I had always strongly favored up to the time of being asked to discuss this paper. Promotion by seniority must go by the board unless the government can relieve us of the executioner's duty by making at least a modest provision for the wholly disqualified, basing it on length of service.

Promotion by seniority did not put the best man at the top of his grade. This is desirable if we can determine his superiority. To do this we must have a totally different sort of fitness report. It should be *constructive*, devised entirely without reference to previously employed records, limited to reports of special, peculiar and specific commendation for unusual excellence. If "selection" is to be combined with "seniority" it should not take a man out of his grade but merely place him at the top of it. Otherwise the asset of experience is liable to be wholly sacrificed.

Whether an improved "selection" supersedes other systems or is retained as a feature of a composite one, heroism should not be an unqualified passport to promotion. I admire, I venerate the young doctor who can paint iodine on a wound or apply a first-aid dressing under fire and tremble to think that I might not make good in such a contingency. He deserves medals, honors, money, etc., but coolness under fire in doing a simple thing does not argue competency for difficult and highly technical performances under other circumstances—surgery, diagnosis, treatment of serious cases, administrative ability, all the enlarged opportunities conferred by promotion. The man who plunges into an engine room full of live steam deserves a medal of honor but he is not thereby proved competent to have charge of an engine room on a full-speed trial or in the hour of battle. He might inspire his division but hazard the ship and turn the scale against us in an even fight.

The word "may" in Lieut. Commander Vossler's proposed enactments introduces a serious element of weakness. Why should the board have an option in weeding out the undesirables if they can be discovered? Why

have a numerical limitation of the men to be eliminated? It seems contrary to business principles to say: "We authorize the board to remove, if it chooses, some of the undesirables but not all." Have we not in these restrictions a door for the entrance of favoritism, personal bias, outside influence? There are six incompetents. The board for its own tacit reasons does not reach the sixth man or decides, more prudently, to eliminate none. Whose friend is he? Whose protégé?

I do not understand the technical requirements for reasonable flow of promotion but it is a safe rule that good practice depends on sound principles. It is a sound principle that: (1) All men of reasonable deserts should be promoted in time; (2) that no undeserving man should be promoted and if not good enough for promotion he should be eliminated; (3) that the few of universally recognized and exceptional merit should get on faster than others. The regular statutory examining board for promotion ought to be so strengthened and helped (one method of doing this has been suggested above) as to be competent to accomplish (1) and (2) or else be abandoned. Selection can accomplish (3) if it be provided for on an entirely new system of determining merit.

Indirect Fire for Naval Guns

(SEE PAGE 61, WHOLE NO. 215)

COMMANDER D. C. BINGHAM, U. S. Navy.—The subject of "indirect fire" afloat is one of increasing and urgent importance and is deserving of the greatest consideration by those concerned with the progress in ordnance material, gunnery and tactics. The development in aircraft and in the use of smoke screens in naval warfare have made "indirect fire" feasible to an extent little understood except by those who have been vitally interested in such matters and responsible for improvement and progress.

The destruction of the *Koenigsberg*, the firing of the allied ships during the Dardenelles, the work of the Monitors of the Dover Patrol, and the low visibility conditions in the North Sea directed attention to this subject.

"Indirect fire" implies that observations or spots (the term used in the navy) will be from a forward position, that is, from a point outside of the ship. The kite balloon was originally adopted to this use but for many reasons it was and is not a satisfactory solution of the problem. Plans have been made for the use of outlaying vessels; this scheme is far less satisfactory than the use of the kite balloon.

Aircraft similar to those used in land warfare are suitable in every way for making the forward observations as they can be landed from heavy ships just before going into action, or from specially constructed carriers to which they can return—*the ideal solution of the problem.*

It may be said without fear of successful contradiction that any naval force that goes into action in the future without every facility for "indirect fire" will be severely handicapped, if not entirely outclassed.

A gunnery officer in commenting on the visibility conditions as a result of his experiences in the Great War made the following remarks:

"I think the important points that have been driven into us in the last year or two are:

"The extreme difficulty of seeing. By this I mean to include anything in the way of a definite target outline, or fall of shot. . . . .

"That in a fleet action the visibility after the first few minutes will always be bad, not from the weather point of view but from the funnel and cordite smoke hanging over the whole fighting area."

Let us assume that one side in a fleet engagement has control of the air and installations aboard ship which permit of "indirect fire," whereas the other side has made no progress in such matters. Can anyone doubt the overwhelming victory that awaits the side that has been progressive?

But there is another all-important factor to be considered under this subject—the smoke screen, not necessarily the smoke screen made by destroyers with which all are familiar but screens made by smoke bombs, shells, boxes. Such bombs will be dropped accurately by aircraft, also carried by all kinds of surface and sub-surface craft to be thrown overboard at the proper time. Then "indirect fire" only will be possible and a navy must be ready for it in every respect.

In this connection, this article on "Indirect Fire for Naval Guns" recalls the account and discussion of "The Destruction of *Koenigsberg*" by Mr. Arthur H. Pollen in his book, "The British Navy in Battle," in which the author invites attention to the lack of "an intelligent system of communicating proved principles and the result of successful practice."

In view of the fact that our navy has no aircraft carriers and none authorized or building, the author's concluding remarks are so pertinent that they are quoted herewith:

"Nothing could better illustrate the curious individualism which governs the organization of our sea forces. Each ship, each squadron, each fleet seems to come to the study of these things as if they were virgin problems, entirely unaided by advice and information from the central authorities, so that there is not only no uniformity of practice—in itself a not unmitigated evil—but what is really serious, a total absence of ***uniformity of knowledge***. I am the last person in the world to suggest that all naval affairs should be regulated in every petty detail from Whitehall. There are quite enough forces at work to repress freedom of thought or restrict liberty to investigate and experiment in the fullest possible way. But there is surely the widest possible difference between a restraining tyranny and an intelligent system of communicating proved principles and the results of successful practice.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Membership

Life, regular and associate, 5490. New members, 527. Resignations, 133.

Membership Campaign

A membership campaign is being conducted, both among officers of the regular service and of the Reserve Force. It is believed that *all officers* should support the Institute by joining. Publication costs are such that a large membership is imperative. The PROCEEDINGS are an excellent medium for keeping officers, and particularly those in an "inactive status," in touch with naval affairs.

The response to this campaign, to date, has been so gratifying that there is a probability of the January number becoming exhausted before all new members can be supplied. In this event, the remaining applicants will have their membership dated as of February 1.

Dues

The annual dues ($3.00) for the year 1921 are now payable.

Regular and associate members of the U. S. Naval Institute are subjected to the payment of the annual dues until the date of the receipt of their resignation.

Discussions

Discussion of articles published in the PROCEEDINGS is cordially invited. Discussions accepted for publication are paid at one-half the rate for original articles, or about $2.25 a page.

Address of Members

All members are urged to keep the Secretary and Treasurer informed of the address to which PROCEEDINGS ***are to be sent, and thus insure their receipt.***

Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 15th of each month.

Book Department

The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

Articles

The Institute desires articles of interest to all branches of the service, including the Reserve Force. Attention is invited to the fact that the submission of articles is not limited to members, and that authors receive due compensation for articles accepted for publication.

Reprints of Articles

The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary and Treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations

Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Notice

Whole Nos. 6, 7, 10, 13, 14, 15, 17, 144, 145, 146, 147, 149, 155, 167 and 173 of the PROCEEDINGS are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 75 cents per copy.

ANNAPOLIS, MD., January 15, 1921.

INFORMATION INDEX

PAGE

ADVERTISEMENTS, INDEX TO I
PUBLICATIONS, U. S. NAVAL INSTITUTE ..... (2)
SPECIAL NOTICE 304
TOPICS FOR ESSAYS 305

PROFESSIONAL NOTES

PREPARED BY

LIEUT. COMMANDER H. W. UNDERWOOD, U. S. Navy

GENERAL ARRANGEMENT

VESSELS BUILDING. NAVAL POLICY. MATÉRIEL. PERSONNEL. MERCHANT MARINE.
- France 253
- Great Britain 255
- Japan 262
- United States 263

AERONAUTICS 272
ENGINEERING 273
ORDNANCE 280
MISCELLANEOUS 281
CURRENT NAVAL AND PROFESSIONAL PAPERS 287

FRANCE

SEAPLANE VERSUS BATTLESHIP.—The comprehensive bombing and firing seaplane experiments shortly to take place on the ex-Austrian 20,000-ton dreadnought *Prinz Eugen* are the object of a careful preparation both in Paris and Toulon, and are expected to elucidate important points of offence and defence that seem to have been overlooked in the course of the recent interesting American experiments in the antiquated *Indiana*. Minister Landry last week jokingly remarked: "*Quant à nous, sans renoncer aux mastodontes, nous préferons pour le présent laisser aux riches marines de l'Angleterre et des Etats-Unis le soin d'en rechercher, par des experiences coûteuses, les caractéristiques nouvelles.*" But the truth, to judge from the activity now being displayed and projected in the experimental line, is that the Rue Royale Admiralty realizes that to copy others is an injudicious policy involving both delay and inferiority, as it is naturally an invariable practice with all Admiralties to keep for themselves the exclusive benefit of the most valuable data collected in costly experiments. An unprecedented outlay is next year to be incurred in practical researches and experiments to be carried out both at sea and in newly-created or enlarged naval laboratories, in the execution of a "*programme de recherches et d'études scientifiques*" framed with the co-operation of the leaders of the French scientific world. From the successful effort France made in the war to catch up to Germany, that had, in 1914, achieved a tremendous advance in that line, it is possible to gauge what her future achievement will be, once narrow-minded *esprit de corps* and petty jealousy no longer stands in the way of a rational utilization of the country's intellectual assets. Moreover, the long experience of realistic investigation which the Gallic Navy possesses will stand her in good stead. The Jena tests proved the means of evolving the best armor-piercing shell, the "*obus alourdi*" of 450 and 600 kilos (3 per cent explosive charge, delayed fuse) which was copied by the German and later by the British Navy. The Duperré experiments showed the worthlessness of torpedo-shells (*obustorpilles Perruchon de 240 mil.*) against strong armor, whilst the successive Lorient experiments in the Mirabeau, Gascoyne, and on the Gâvres firing range demonstrated the value of "elastic cushions" and longitudinal bulkheads to minimize the effects of

submarine explosions, together with the superiority of the new type of armor (Homecourt-St. Chamond, chrome-nickel-elastic surface), without mentioning the turret and fire-blast tests in the *Henri IV*, and *Suffren*, and also the successful experiments carried out in the course of the war with a view to a better protection of powder magazines and of the vital parts of ships.

The avowed intention of the Minister of Marine is, so to speak, to permanently mobilize the scientific and industrial resources of the Republic for the benefit of the naval armament, and a start is to be made with a test of the vulnerability of armored ships to aerial attack, which will have a great influence in shaping the policy of to-morrow. If the *Prinz Eugen* is sunk by seaplanes, a series of conclusions most agreeable to the *Jeune Ecole* will be drawn, namely, that aerial flotillas, while being cheaper than torpedo or submarine flotillas, are in a position to victoriously assail battle squadrons both on the high sea and in harbor, and the battleship is doomed, having about as much chance as a "*lapin poursuivi par un aigle*," and consequently, that France can strike from the air at any likely enemy, defend her coasts, and control narrow seas, thus preserving at small cost a determining influence on European sea contests.

No wonder the utmost care is being taken to avoid faulty or incomplete conclusions being arrived at through hasty and insufficient preparation of the three component elements of the forthcoming test, viz., the target, the bombing machines, the projectiles.

The *Prinz Eugen*, while being well built (French experts consider Austrian construction to be excellent, and superior to that of the Boche), is over-gunned, top heavy, and not up to the French standard of battleship robustness, being especially inferior in deck protection and armoring generally, even to the *Mirabeau*. Modifications, some strengthening, and the fitting of anti-aerial overdeck screens are required, as what it is sought to learn is not the anti-aerial worth of the ships of yesterday, but the value of the very latest anti-aerial devices. If the target cannot be towed or be controlled electrically, as was the United States *Indiana*, the experiments will lose some of their interest.

As to the projectiles, the arsenal of flying machines has considerably increased since the war, mostly owing to bombing experiments conducted by the Ministry of War, that is working in cooperation with the Admiralty in the interests of aerial offence. The bombing test will commence with the projectiles of least caliber and destructive power, as it is intended to preserve the valuable target as long as possible, and to minutely ascertain the results of the successive hits and explosions, which means that the bombardment may last many days: (1) *Obus-fumigênes*, smoke-producing, intended to temporarily blind conning-tower and turret complements, and so for a little time put the ship *hors de combat*. (2) Asphyxiating shells, inflicting permanent disabilities on the personnel. (3) Incendiary bombs, combining also the effects of the first-named missiles. There are several types in service in the army, of which Commandant Ortlieb says: "*Les obus incendiaries ont été rarement employés avec succès* (L'Aeronautique—Masson, Editeur, Paris). (4) Small 10-kilo bombs, army type, to be dropped by the dozen with a view to the lucky shot into funnels or unarmored openings. (5) Heavy armor-piercing bombs, up to one ton, the direct hit of which no deck protection could resist. (6) Torpedoes or Michelin bombs, for direct or indirect hits, intended by their tremendous blast to cause internal explosions or other paralyzing damage. If the last-named projectiles are only half as powerful as claimed by their inventors, the *Prinz Eugen* will founder with the first blow.

But there will only be counted those projectiles that hit the target, and to judge from what occurred in the United States *Indiana*, bomb-dropping at a great height over a moving target (30 mêtres by 160) is not a particularly accurate game, as was also shown by the bombing of the *Goeben*. Rightly or wrongly, however, French aviation "aces" are believed to excel

all comers in the matter of up-to-date aiming appliances and of training. With the Michelin "*viseur*," improved and experimented upon in the Aulnat camp, and especially with the bomb-dropping "*en trainée*," in clusters, every machine flying over the Austrian target ought to secure hits. The forthcoming tests will afford splendid training to the body of naval aviators whose spirit is being revived by the encouragements the present Minister is bestowing on aviation. Torpedo-launching by seaplanes offers the possibility of simultaneous concentration of several machines against one target, whereas even in group flying the only tactics are individual bomb-dropping. All these questions will receive attention.

So far so good; but the misfortune is that the coming tests, whatever efforts are made, will not give even an approximate idea of what will take place in war, when a battleship at sea will oppose to her aerial antagonists (1) her zig-zag course, (2) the bursting shells of her anti-aerial battery, (3) the watch and attacks of her escorting *avions de combat*, and (4) by night, the blinding flash of her searchlights, without speaking of the protecting screen of smoke which the ship could raise. It must be added that to carry heavy projectiles, and be really dangerous to battleships, hydravions must attain a high carrying power, at least two tons, which means a span of over 40 mètres; that is heavy, relatively slow and vulnerable machines. Armored avions will never have plates thick enough to resist medium-size naval guns.

Therefore, before an unthinking popular craze sets in, it is well to remember that the question has two sides, that the outlook for anti-aerial defence is, on the whole, bright, and, lastly, that wisely-managed navies build for to-morrow, and not merely for to-day, taking into consideration the fact that any new danger is sure to-morrow to meet its antidote. Moreover, aerial command of the air is somewhat negative; it would not do to forbid others using the sea and to lose yourself the vital benefit of safe sea communications, and so armored ships will ever be necessary to enforce their right to sail against both aerial and submarine ambushes and to attend to the needs of maritime transportation.

The importance of safe maritime communications and of an adequate fleet to guard them is no longer denied in military circles, and army experts are unanimous in advocating a strong "programme naval." Significant reference to this subject is notably to be found in the "*Leçons de la Guerre, par le Commandant Bouvard* (Masson, publishers), " which call attention to the much-increased rôle of the sea in the contests of to-morrow, and to the vanity of military preparation that is not based on the command of the sea, on the faculty of receiving oversea reinforcements and supplies. "*La maîtrise des mers est une nécéssité primordiale. Il n'y aura plus de guerre purement continentale* ." (Page 20.) The author, it is worth noting, foresees the triumph of the submarine, in keeping with the evolution in land warfare: "*car le guerre fuira la surface des eaux comme elle fuit la surface du Sol.*"—*The Naval and Military Record*, Dec. 15, 1920.

GREAT BRITAIN

A SCHEME OF EMPIRE NAVAL DEFENCE.—It is not long since we drew attention to the serious decline that is taking place in the relative strength of the British Navy owing to the higher standard of tactical efficiency which has been adopted for capital ships since the war. We pointed out that progressive naval opinion was not prepared to rate as first class any ship of this type which mounted guns of less than 15-inch caliber. Additional point has now been given to our observations by the statement of a London paper that the Admiralty would be ready to dispose of all our present battle-cruisers, excepting only the *Hood*, if purchases could be found for them. Such vessels as the *Lion*, *Princess Royal*, and even the *Tiger* are now regarded as obsolete in the battle-cruiser category, on the ground of inadequate armament and speed. If this statement really repre-

sents the views of the Admiralty, the future status of the British Navy will be considerably lower than is commonly realized. We are not by any means well supplied with ships that come up to the latest standard of fighting power. There are only 10 British battleships with a 15-inch armament, and only 3 battle-cruisers which combine 15-inch guns with a speed of 30 knots or over. No new ships are under construction, nor does there seem much likelihood of any large armored ships being ordered within the next year or so. On the other hand, large programs are in course of execution in America and Japan, both of which powers are reconstructing their battle fleets on the basis of maximum efficiency as regards the individual power of the ships.

The Admiralty are aware, of course, of what is taking place abroad, and would certainly recommend the resumption of shipbuilding here if they considered our position to be as unsatisfactory as the above figures indicate. The fact that they have not yet done so is significant. The constitution of the present board is a guarantee that the vital interests of the navy will not be sacrificed to political expediency. If Lord Beatty and his colleagues believed that new battleships were urgently needed they would not hesitate to approach the government in this sense, or to take strong action if their advice were disregarded. Our own view is that both the Admiralty and the Cabinet are in agreement as to the desirability of waiting upon events a little longer before drafting any hard and fast scheme of naval policy. As Mr. Lloyd George announced in Parliament a fortnight ago, it has been arranged that the Dominion Premiers shall come to London next June to confer with the Imperial Government. At this meeting the whole question of naval defence will be exhaustively discussed, and hopes are entertained that decisions satisfactory to all parties will be reached on every essential point. The destruction of the German Fleet and the absence of any new challenge to our sea supremacy in Europe are factors that enable the home authorities to take a broader view of Imperial defence than was possible when the German menace seemed to fill the whole strategical horizon. It is certain, therefore, that any suggestions from Australia, New Zealand, and Canada touching a more adequate representation of British naval power in the Pacific will receive a sympathetic hearing from the Admiralty.

Although the reports submitted by Lord Jellicoe in 1919-20 have not yet been published in full, they are known to embody very large proposals in this direction. In his judgment the security of our Imperial communications will demand in the next five years the formation of a powerful fleet for service in Far Eastern waters. This fleet, he considers, should be made up of units from the Royal Navy, the East Indies Squadron, and the Navies of Australia, Canada, and New Zealand. It should consist of at least 8 battleships, 8 battle-cruisers, 10 light cruisers, 40 destroyers, and 36 submarines, all of modern type. The cost of maintaining this fleet is estimated at £19,750,000, of which sum Australia would contribute £4,000,000, eventually rising to £6,000,000, and New Zealand's share would be £375,000, rising within five years to £4,000,000. The amount of Canada's contribution is apparently left open. The dimensions of this new fleet may seem startling at first sight, but a moment's reflection will show that it would be no stronger relatively than the force that we used to maintain at Malta when the Mediterranean Sea was our chief frontier. It is an elementary principle of strategy to concentrate strength at the most sensitive point. This principle has always guided our naval dispositions up to now, and it would be the height of folly to ignore it in future simply because its observance would mean keeping the bulk of our naval force on the other side of the globe. If the creation of such a Far Eastern fleet is considered to be the chief task of the future its accomplishment should be well within the combined resources of the empire. We already possess many of the ships specified, but it would be necessary to build more battle-cruisers to bring the fleet up to its full strength in this type. As for home defence, this duty might safely be entrusted to our older ships, armed with 13.5-inch guns,

which, although not up to the ultra-modern standard of fighting power, are certainly superior to the capital ships of other European Navies. A solution of the Empire naval problem along the lines we have sketched would appear to fulfil every requirement, and granted a fair and equitable apportionment of the common burden, its cost need not impose an intolerable strain either on the mother country or the Dominions.—*The Naval and Military Record*, Nov. 24, 1920.

ECONOMY AND SECURITY.—It is now becoming clear to the public that a survey of the naval horizon at the present time shows three courses to be open to us as a nation and empire more dependent than any other in the world on sea power. The first is to maintain our present position of supremacy at all costs. The second is to consent to a state of equality with the next strongest naval power. The third is to do nothing and thereby drop to the second, possibly even the third, place among the maritime nations. There is apparent a tendency in certain quarters to confuse the issue by an appeal to controversy as to whether the battleship has not been displaced, as the primary unit of naval strength, by some other type. This, however, has really nothing to do with the broad question of national policy on which the government must make a decision. Battleships or submarines are merely the terms in which naval power is expressed, and the Admiralty must be the best possible judges as to which of the two classes are the more essential, or in what proportions they shall be provided in the future fleet. The standard of strength is laid down by the Cabinet, but the board see to its maintenance.

It would seem that the government, from certain hints given by Mr. Lloyd George in recent speeches, particularly that at the dinner last week of the Federation of British Industries, incline to the third course outlined above, animated solely by a desire for national economy. The Premier is reported to have said that "You must take into account not the merits of any particular proposal for expenditure, but the national resources for the time being, when the burdens on the community are gigantic, and when things, which may be all right three years hence, at the present moment are unwise and beyond our means." It is not certain, of course, that the Prime Minister would regard a proposal to resume warship construction in this light, but at least there must be some of his followers, and many of his critics, who would do so. The need of the moment is for information and guidance on the present naval situation, so that an enlightened public opinion may be ready to judge any measure which the Admiralty may find it necessary to recommend to the country. Do the people know that no battleship has been laid down in England for nearly seven years—since the keel of the *Royal Sovereign* was laid on January 15, 1914; but that since April 24, 1917, America has laid down 10 such vessels and Japan 4? Also that America has 6 battle cruisers of post-war design, and Japan 4, building or authorized, to our one *Hood*, of what may be called semi-post-war design? Here is a chance for the Navy League to fulfil its primary purpose by placing the facts and figures before the country.

Of the urgency of economy there can be no question. It has been insisted upon frequently in this journal during the past two years, if only because we should need money later to maintain our naval position. If it should come about that even the desire to save money has to be sacrificed to build ships, it will be because the navy is our main insurance, essential to our well-being and prosperity. The Admiralty have done their part, for as Admiral Sir Dudley De Chair said at the Guildhall last month, they give place to none in not only practising the greatest economy, but in setting the example in so doing. This, indeed, has been the remarkable contrast. The navy, the bulwark of our security and the mainstay of our overseas trade, has been cut down to the bone, while money has been squandered on schemes of new Ministries. A Bill for an *extra* nine and a half millions has just been presented to Parliament by the Ministry of Labor, the new Mines Department, and others, and moribund

Ministries—such as those for shipping, munitions and food, which should have been wound up months ago—continue to pour out public money. No work upon which these offices are engaged can be relatively as important to the welfare of the Empire as the maintenance of an adequate, efficient, and ready fleet.—*The Army and Navy Gazette*, Dec. 11, 1920.

ROYAL AIR FORCE.—A brief summary of Royal Air Force organization, policy and estimates, as formulated for the current financial year.

The permanent organization of the Royal Air Force was outlined in a memorandum prepared by the Chief of the Air Staff, and presented to Parliament, with a note by the Secretary of State, in December, 1919 (Cmd. 467).

In planning the organization of the Royal Air Force, it was assumed that in the immediate future nothing in the nature of a general mobilization need be contemplated, that efforts should be concentrated on providing for present needs, and on founding a highly trained and efficient force, capable, without drastic alteration, of expansion should the necessity arise in years to come. The principle has accordingly been to limit the number of service squadrons to the number considered essential to meet our present responsibilities, to devote the remaining resources to perfecting the training of officers and men and to constructing a sound framework on which to build the Royal Air Force of the future.

The principle to be kept in mind in forming the framework is that in the future the main portion of the Royal Air Force will consist of an Independent Force together with the personnel required to carry out aeronautical research. In addition, there will be a small part of it specially trained for work with the navy, and a small part specially trained for work with the army. It is possible that the main portion, the Independent Air Force, will grow larger and larger, and become more and more the predominating factor in all types of warfare.

The present policy is to create an air force spirit, or rather to foster this spirit, which undoubtedly existed in a high degree during the war; to eliminate accidents, which necessitates the thorough training of mechanics in the numerous trades required, and consequently the enlisting of skilled ranks as boys and training them in the service; to train officers in technical subjects, such as navigation, meteorology, photography, wireless, etc., experts being essential for the development of the science of aeronautics, which is still in its infancy.

The training for officers and men is briefly as follows: In the case of officers, owing to the necessity for a large number of officers in the junior ranks and to the comparative paucity of higher appointments, it is not possible to offer a career to all. Consequently, some 50 per cent only of the officers are permanently commissioned in the Royal Air Force, the remainder being obtained by granting short service commissions and by seconding officers from the army and navy. Great importance attaches to the last class, since an interchange of officers is bound to make for closer and more intelligent co-operation between the services.

The channels of entry for permanently commissioned officers are through the Cadet College at Cranwell, from the universities and from the ranks. The Cadet College is the main channel. The course lasts two years, during which the cadets are given a thorough grounding in the theoretical and practical sides of their profession and learn to fly the approved training machine.

On leaving the College cadets are commissioned and posted to a squadron. Apart from courses that every officer will normally pass through, such as gunnery and air pilotage, officers will be required, after five years' service, to select the particular technical subject they will make their special study during their subsequent career, *e. g.*, navigation, wireless, engines.

The career of an officer commissioned from the universities or from the ranks will be identical with that of those from the Cadet College, except

that he will be taught to fly at a training wing before joining his squadron. Short service and seconded officers will be taught to fly at training wings and will attend a course of aerial gunnery, and probably one of air pilotage.

With regard to men, which constitutes the most difficult problem of all, it has been decided to enlist the bulk of those belonging to long apprenticeship trades as boys, who will undergo a course of three years' training before being passed into the ranks. The boys, on successfully passing their final examination, will be graded as leading aircraftsmen and a certain number will be specially selected for a further course of training, at the end of which they will either be granted commissions or promoted to corporal. Those granted commissions will join the Cadet College.

The remainder of the mechanics, of whom more than half will belong to short apprenticeship trades, are being enlisted as men and receive twelve months' training before being posted to units.

Non-technical men are given a short course of recruit training at the Royal Air Force Depot at Uxbridge.

The Royal Air Force estimates for 1920-21 provide for an establishment of 29,730 officers, warrant officers, non-commissioned officers, airmen and boys (exclusive of those serving in India).

The net estimate for effective services includes:

	£
Pay, etc.	4,661,000
Quartering, stores (except technical), supplies and transport	2,005,000
Technical and warlike stores	6,172,850
Works, buildings and lands	3,647,000
Air Ministry	877,000
Experimental and research services	2,575,540

The following units and establishments are provided for in the above estimates:

UNITED KINGDOM

Striking Force	2 Squadrons.
Training Wings	2 of 3 Squadrons each.
Co-operation with Army Divisions	1 Squadron.
Co-operation with the Fleet (Home waters).	1 Squadron Reconnaissance and Artillery machines. 1 Flight Ships Fighters. ½ Squadron Torpedo Machines. 1 Flight Flying Boat. 1 Flight Float Seaplanes.
Communication duties	1 Squadron.
Experimental Stations	4 Stations for Aeroplanes, Seaplanes, Torpedo Machines and Wireless respectively.
Schools and Training Centers	Cadet College. Navigation School. Flying Instructors' School. Administrative and Technical School for Officers. Wireless and Electrical Training School. School of Photography. School of co-operation with navy. School of co-operation with army. Balloon Training. Airship Training. Boys' Training Center. Technical Men'sTraining Center. R. A. F. Depot and Non-technical Men's Training Center.

Depots	2	Aeroplane Repair Depots.
	1	M. T. Repair Depot.
	3	Stores Depots.
Airships	1	Station.

OVERSEAS

India	8	Squadrons.
	1	Depot.
Egypt	7	Squadrons.
	1	Depot.
Mesopotamia	3	Squadrons.
Malta	1	Flight Seaplanes.
Alexandria	1	Flight Float Seaplanes on carrier.

HIGHER ORGANIZATION

In the United Kingdom all units working with the navy are included under one command, known as the "Coastal Area."

The Coastal Area comprises two "Groups." No. 29 Group at North Queensferry, and No. 10 Group at Lee-on-Solent.

The other Royal Air Force Command is known as the "Inland Area," comprising No. 1 Group, with headquarters at Kenley, which includes Royal Air Force units in the area that corresponds to the Eastern Army Command; No. 7 Group (Andover), corresponding to the Southern Army Command; and No. 3 Group (Spittlegate), corresponding to the Northern and Western Army Commands.

Directly under the Air Ministry are the 11th (Irish) Wing, the Airship Base at Howden, No. 1 School of Technical Training (Boys), at Halton, and Cranwell Cadet College.

Overseas are:

(i) The Middle East Area, comprising the Egyptian Group, the Palestine Group and the 31st (Mesopotamia) Wing.

(ii) The Mediterranean Group (Headquarters, Malta), comprising all units (for co-operation with the navy in the Mediterranean).

(iii) The Indian Group.

RECENT EVENTS

On August 1, No. 55 Squadron, which, with its repair unit, had arrived at Constantinople from Suez on July 13, was ready for the field. By the time the squadron was ready an alteration in the situation averted the need for active offensive action and machines were consequently chiefly employed on photographic work.

On August 25, owing to the spread of disturbances in Mesopotamia, it was decided to transfer this unit to that country. The Admiralty were able to make H. M. S. *Ark Royal* available for this move. With the special accommodation provided on the *Ark Royal* it was only necessary to remove the wings from the machines to enable them to be loaded. H. M. S. *Ark Royal* sailed from Constantinople on September 4 and reached Basra on September 23. The disembarkation was completed by September 25, and a week later all machines were serviceable and eight had already arrived at Bagdad by air.

This move very clearly demonstrated the immense value of the aircraft carrier for the rapid transport by sea of Royal Air Force units. Had it been necessary to employ an ordinary ship in this instance, machines would have had to be completely dismantled and packed in cases, and great delay would have resulted both at Constantinople and Basra.

No. 84 Squadron has been reformed in Mesopotamia and is equipped with D. H. 9A's.

In common with the army the Royal Air Force has had to respond to many calls as a result of the rising in Mesopotamia. Machines have been

actively co-operating with relief and punitive columns and many reconnaissances have been necessitated. A considerable amount of independent bombing has been carried out and satisfactory results have been obtained.

Medical comforts and other necessaries were dropped on the beleaguered garrisons at Kufa and Samawah, including, at the latter place, a replacement for a damaged component of the post's wireless set.

Communication with Kufa was maintained by aeroplanes, by means of a Popham panel, which had to be dropped in the first instance.

During September a torpedo attack trial by ten torpedo-carrying aeroplanes against H. M. S. *Queen Elizabeth* was carried out. Most interesting results were obtained.

A Dutch Naval and Military Commission has arrived in this country to study the organization of the Royal Air Force.

Four non-rigid airships, spares and equipment have been handed over to the Dominion of Newfoundland as a free gift.

Sanction has been given for the appointment of Air Attachés at Paris, Washington, Tokio and Berlin.

Arrangements have been made to send ten officers into residence at different colleges at Cambridge to take a special course in engineering.

Proposals have been put forward to the institution of Mechanical Engineers, the Institution of Electrical Engineers and the Institution of Civil Engineers, that officers granted short service commissions in the Royal Air Force, who subsequently take up the engineering profession, shall be allowed to count their service in the Force as the equivalent of the time which they are normally required to spend in workshops before they can become eligible for membership of an engineering institution.

The Ministry of Labor has invited the Air Ministry to confer with them on the question of securing recognition by the principal trade unions of the Boy Mechanics' Training Course as equivalent to periods of apprenticeship, in order to secure their acceptance by trade unions as skilled men on the termination of the period of active service. The importance of the question lies in the fact that a satisfactory agreement with the trade unions will probably affect largely both the numbers and the quality of the candidates for entry as boy mechanics.

Volunteers have been asked for from the navy and army for seconding to the Royal Air Force, for a period of four years. Nine officers have been so seconded from each service.

The formation of five additional reserve squadrons has been approved. Two of these will be formed in Egypt and numbered 8 and 45 respectively, the formation of the former being taken in hand at once to replace No. 55 Squadron, transferred from Egypt to Mesopotamia. No. 8 Squadron will be equipped with D. H. 9A machines.—*The Journal of the Royal United Service Institution*, November, 1920.

BRITISH SHIPYARDS ARE FACING PERIOD OF DEPRESSION.—London, Nov. 20.—During the past twelve months there has been remarkable activity in British shipyards notwithstanding the high price of materials and repeated labor trouble; but the outlook for the immediate future is not bright, as when the vessels which have been under construction this year have been completed, there is not much new work to take their place.

It is extremely doubtful whether during the next twelve months another 2,000,000 gross tons of shipping will be put in hand. The rate of construction has fallen off since the war both to reduced hours and reduced output per man; it is doubtful whether the old rate can be regained. Practically the whole of the vessels under construction last summer—780 ships with a gross tonnage of 2,520,000 tons—have now been added to the British merchant marine, which is now approximately equal to what it was before the war. Owing to a variety of causes it is not now as efficient as it was, due to congestion and loss of time in harbor, defective railway facilities, labor difficulties and so on; consequently the effective work which can be got out of a vessel has been reduced fully 25 per cent.

U. S. Restored Balance.—Expressed differently, 20,000,000 gross tons of shipping are now only equal to 16,000,000 of pre-war times. That should render the total tonnage of the world, nearly 54,000,000 gross tons, insufficient for the world's trading requirements; but the United States has restored the balance by the remarkable feat of increasing her seagoing fleet by more than 10,000,000 gross tons.

The cost of shipbuilding now exceeds $144 a deadweight ton, not far below the American lead. Normal construction is now general, both in Great Britain and other European countries, and the building of so-called standard ships has ceased; it was a passing practice of doubtful value here and even during another war it is doubtful whether it would be revived on this side.

The value of standard ships is much below that of vessels built to owners' special requirements. Most shipping companies will be prepared to pay higher prices for specialized ships. A number of trading steamers which have been completed and are rapidly approaching completion, which have a higher speed than was generally considered to be truly economical before the war. The 10 to 11 knots of pre-war cargo vessels is now being increased to 12 and 13 knots, that may tend to neutralize loss of time in harbor.

Economy of Oil Fuel.—Probably most of the more recently ordered trading steamers will use oil fuel, as the enormous rise in the price of coal since the war renders its use unprofitable; alternately they are being provided with internal-combustion engines of the Diesel type. Coal-fired steamers are subject to frequent delays owing to difficulties of obtaining fuel.

Assuming the price of oil to be 50 per cent greater than that of coal, or even double the price of coal, say $28.80 against $19.20, as a steamer provided with oil-fired boilers only requires approximately 50 per cent of the weight of fuel, as compared with the requirements of a steamer using coal, it is obvious that a desirable economy is possible, in addition to which the labor bill is much reduced.

In a motor ship the weight of oil required is barely one-fourth that of coal used in a steamer of corresponding size and speed. It only requires an assurance that oil could be obtained everywhere, for coal-fired steamers to become obsolete within a few years. Motor vessels of large tonnage are now being constructed in Great Britain; they are in fact becoming extremely popular with shipping companies. Thirteen thousand tons and a speed of 13 knots will soon be left behind. Each vessel of this tonnage has two oil engines, each of 3300 horsepower with eight cylinders.

Motorships in Italy.—Due no doubt to Italy being without coal deposits, motor shipbuilding is being rapidly developed there. Quite a large fleet of Diesel-engined vessels has been constructed since peace was declared; from 50 to 60 steamers varying from 6000 tons deadweight to 11,000 tons. Both two-cycle and four-cycle motors have been installed, with four cylinders of 1150 horsepower each, driving twin screws, yielding a speed of about 11 knots and consuming 11 tons of fuel for each 24 hours. In these F. I. A. T. installations the main air compressors are driven direct from the crankshaft.

Shipping companies in England have without an exception greatly increased their profits compared with 1913.—*The Nautical Gazette*, Dec. 11, 1920.

JAPAN

JAPANESE PRESS CRITICISM OF JAPAN'S BUILDING PROGRAM.—It now cost over Y70,000,000 to build a battleship, and if the present tendency toward bigger ships and bigger guns continues, time will not be distant when the cost of a battleship will amount to Y80,000,000. Japan is short of funds, and she should devote her efforts toward the construction of the so-called economical navy.

If the 8-and-8 fleet is to be always maintained, it will require over Y250,000,000 every year, and when various accessory expenses are taken

into account, the armament expenditures will amount to a great figure. Moreover, experts say that even the 8-and-8 fleet is not sufficient to meet the requirements of the country, and they urge that another extra fighting unit should be provided. If the naval armaments of the country are to be completed and maintained perfect, over 30 per cent of the total expenditure of the state will have to be annually devoted to this object, a proposition which it is difficult for the country to bear in the present state of its financial position. It is, therefore necessary that the authorities should strike a new line in naval policy and maintain an economical navy. The most important thing in this connection is the reform of battleships which constitute the main force of the navy.

In our opinion the main units of the fleet should not be divided into battleships and battle-cruisers. In order to construct an economical navy, the differentiation should be effaced in favor of battleships of high speed. At present there is a difference of about six knots between the speed of battleships and that of battle-cruisers. The smaller the difference the better.—*Jiji*, Nov. 26, 1920.

UNITED STATES

ANGLO-SAXON UNION TO BAR JAPANESE IMMIGRATION.—The cry for a white Australia has been followed so continuously by similar cries in Canada and the United States that a possible working agreement between the United States, Canada, Australia, New Zealand, and South Africa is now being bruited for the purpose of maintaining a united front against Japanese immigration. This question is described as a club in the hands of the British Dominions which they intend to have ready at the Imperial Conference next spring when the subject of the Anglo-Japanese Alliance will be discussed. Meanwhile, how is Japan to find vent for her surplus population, now increasing at the rate of three-quarters of a million a year, asks a Tokyo correspondent of the London *Morning Post*, who says that this is one of the most difficult problems confronting Japan's statesmen, and may in some measure explain the nation's expansive policy. There are now more than 350 Japanese to the square mile, and as most of the sparsely settled lands of the world are under British or American rule, this informant points out, Japan naturally looks toward England to help her out of the dilemma. Because England "hesitates to offer any solution to the problem and at the same time bars the door against the Japanese, while admitting Germans and others, Japan cannot understand her avowals of friendship." We read:

"She holds that race prejudice must be hopelessly ingrained when it refuses to find relief for labor troubles by welcoming the more efficient and strenuous toilers of the Far East. Japan regards the immigration problem as something more than a question for her or for any one nation, as a matter that should concern humanity. It may be that she will find some measure of relief in the new fields being opened up in Manchuria, Siberia, and Saghalien; but the Japanese are not naturally a northern people; they do not like a climate of low temperature, and so are not likely to migrate in any considerable number northward unless there is abnormal profit in it, and even then but temporarily. After the forests and mines are fully exploited it is improbable that the Japanese will care to remain. Moreover, in the view of Japan, this policy would but retard for centuries longer the evolutionary process that must needs bring East and West together if humanity is to attain ultimate unity and its highest development. The longer that blending of the higher races is delayed the greater will be the clash, she holds, when they are forced to meet by sheer congestion. A harmonious intermingling of East and West by gradual immigration would insure a more humane result."

In the Japanese press attention is largely directed to Japan's relations with the United States as affected by the anti-Japanese legislation in California. The Tokyo *Yomiuri* warns Americans that to exclude the Japanese

from California would be disastrous economically, for—

"As we have said, the Japanese plow desolate land and convert it into fine fields. What would be the result if all the Japanese withdrew from California? Land measuring hundreds of thousands of acres would revert to the former state of ruin. It would become impossible for California, which is famous for its fruit, to export so many apples, oranges, or grapes. The cultivation of rice in northern California would, of course, be suspended. Thus railways and ships trading with California would suffer from the falling off in freight, and there is little doubt that the prosperity of the famous port of San Francisco would be impaired. When the situation is thus considered, the anti-Japanese agitation of California is by no means an economic issue, as Americans say, but a very uneconomical question. If American laborers think that if Japanese are excluded from California, their own wages will rise and that their conditions of living will improve, they are egregiously mistaken. The development of California is prompted and promoted by Japanese immigration, and the Japanese immigrants obtain much benefit in that state. Exclusion is disadvantageous to both sides."

As to assimilation between races, the Tokyo *Chuwo* remarks:

"There are over 10,000,000 negroes in America. The Americans and the negroes represent two extremes, and no two things can be more different from each other than those two peoples. Yet the negroes form part of the organism of America, and their admission is due to the magnanimity of the Americans. Since the Americans and the negroes can work together, it may be said that no people cannot get together with the Americans. When 1,500,000 Jews made their way from Russia to America, it startled the world, but the immigrants were soon assimilated.

"The Japanese immigrants in America number only 70,000 or 80,000. Their presence ought not to cause any trouble, especially because they are earnestly working in the interest of America. Some Americans say that the Japanese are not assimilable, but this plea is wrong. No people are more assimilable to America than the Japanese, and, indeed, the complaint is frequently made in this country that they are too much like Americans. If there is anything in the attitude of the Japanese immigrants which makes the Americans think that it is difficult to assimilate them, it is due to the anti-Japanese agitation. The best means of facilitating the assimilation of the Japanese is to abandon the agitation. The fact that in spite of the frequent anti-Japanese agitations the Japanese immigrants have never resorted to any intrigues is the best testimony to their character."

Even if the principle of equality, for which Japan fought at the Peace Conference, were acknowledged by the League of Nations, says the Tokyo *Nichi-nichi*, it would be "meaningless" if the Powers did not abolish discrimination, but—

"It is a great mistake to think that if the principle of equality is recognized, the Powers will be placed under obligation to eliminate all discrimination against Japanese. The various nations have different traditions and stand in different position; it is absolutely within their right to impose restrictions on the peoples of other countries. From this point of view, we should be magnanimous enough to appreciate the fact that America is compelled to restrict Japanese immigration for internal reasons. As the resolution passed by the World's Sunday-school Convention declares, race inequality is contrary to the interests of mankind and deleterious to the peace of the world. Even if Japan had not introduced the race-equality proposal to the Paris Conference, she should take the present opportunity to espouse the principle. The Japanese are more than ever conscious of the necessity of abolishing all racial inequalities; their object is not to gain any political benefits but to get rid of spiritual insults."

In Australia the Melbourne *Herald* contends that there are valid objections to intermixture between races of widely different quality and traditions, even when they are capable of a considerable degree of assimilation. It has no wish to antagonize or to be unjust to an admittedly great people,

NAVY DEPARTMENT—BUREAU OF CONSTRUCTION AND REPAIR

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY—DEGREE OF COMPLETION, AS REPORTED DECEMBER 31, 1920

Type, number and name	Contractor	Per cent of completion			
		Jan. 1, 1921		Dec. 1, 1920	
		Total	On ship	Total	On ship
Battleships					
44 California	Mare Island Navy Yard	95.2	94.2	94.8	93.7
45 Colorado	New York S. B. Cpn.	64.8	60.2	63.2	58.3
46 Maryland	Newport News S. B. & D. D. Co.	90.	89.1	86.5	85.5
47 Washington	New York S. B. Cpn.	55.4	47.3	54.1	45.3
48 West Virginia	Newport News S. B. & D. D. Co.	41.2	29.2	37.7	25.2
49 South Dakota	New York Navy Yard	19.8	12.	17.6	9.8
50 Indiana	New York Navy Yard	14.9	7.1	13.8	6.
51 Montana	Mare Island Navy Yard	15.9	8 3	15.1	7.3
52 North Carolina	Norfolk Navy Yard	19.8	12.1	18.6	11.3
53 Iowa	Newport News S. B. & D. D. Co.	11.9	8.6	10.9	7.6
54 Massachusetts	Beth. S. B. Cpn. (Fore River)	.7	....	.5	....
Battle Cruisers					
1 Lexington	Beth. S. B. Cpn. (Fore River)	5.1	.5	3.5	.4
2 Constellation	Newport News S. B. & D. D. Co.	3.6	2.1	2.6	1.1
3 Saratoga	New York S. B. Cpn.	11.3	5.6	8.	4.4
4 Ranger	Newport News S. B. & D. D. Co.	.9	.3	.9	.3
5 Constitution	Phila. Navy Yard	1.8	.6	1.4	.5
6 United States	Phila. Navy Yard	1.8	.6	1.4	.5
Scout Cruisers					
4 Omaha	Todd D. D. & Const. Cpn.	84.4	77.5	81.5	73.9
5 Milwaukee	Todd D. D. & Const. Cpn.	74.4	70.9	71.1	67.7
6 Cincinnati	Todd D. D. & Const. Cpn.	54.4	44.	50.2	35.8
7 Raleigh	Beth. S. B. Cpn. (Fore River)	35.6	20.7	30.2	16.4
8 Detroit	Beth. S. B. Cpn. (Fore River)	34.7	19.8	28.8	15.
9 Richmond	Wm. Cramp & Sons Co.	58.	....	56.	....
10 Concord	Wm. Cramp & Sons Co.	57.	....	55.	....
11 Trenton	Wm. Cramp & Sons Co.	38.	....	34.	....
12 Marblehead	Wm. Cramp & Sons Co.	36.	....	33.	....
13 Memphis	Wm. Cramp & Sons Co.	28.	....	26.	....
Miscellaneous					
Fuel Ship No. 18, Pecos	Boston Navy Yard	51.5	49.	47.	44.
Gunboat No. 22, Tulsa	Charleston Navy Yard	43.8	32.1	41.8	28.1
Hospital Ship No. 1, Relief	Phila. Navy Yard. Comm. 12-28-20			99 4	99.2
Amm. Ship No. 2, Nitro	Puget Sound Navy Yard	99.7	98.8	99.6	98.5
Rep. Ship No. 1, Medusa	Puget Sound Navy Yard	49.3	35.8	45.8	35.6
Destroyer Tender No. 3, Dobbin	Phila. Navy Yard	45.4	45.	41.4	41.
Dest. Tender No. 4, Whitney	Boston Navy Yard	7.5	3.	6.5	2.5
Sub. Tender No. 3, Holland	Puget Sound Navy Yard	7.1	....	8.6	....
Aircraft Tender, Wright	Tietjen & Lang	25.	....	13.	....

In addition to the above there are under various stages of construction 31 destroyers, 45 submarines and 1 seagoing tug.

There were delivered to the Navy Department during December, 1920, 8 destroyers, 2 submarines, 1 seagoing tug and 1 hospital ship.

Authorized but not under construction or contract 1 transport, 12 destroyers and 7 submarines.

but "cannot escape the fact that Japanese settlement means the planting of Japanese outposts." Japan is a country of the "most determined and undying nationalists," according to this Melbourne daily, which continues:

"Her people take their country with them wherever they go. Is it reasonable to expect any nation to admit without restriction the settlers of a race which establishes colonies incapable of assimilation into the general life of the community? It is quite possible that such colonies would ultimately be dotted all over the United States. Their members would remain the nationals of a country known to be exceedingly ambitious, with an ever-advancing military and naval equipment, and most evidently bent upon commercial and imperial expansion. Another fact of great significance is that Japan is the only autocracy left in the world. Her Parliamentary system is not at all democratic, and the persons who control her destinies are the 'Elder Statemen,' a very close corporation of nobles. Recent Japanese labor troubles have shown that industrial conditions are as bad as they were more than a century ago in Western countries. Labor has not yet gained the real right of organization. Every effort is made to check the growth of trade-unionism. Japan's existing rights in Korea and Manchuria give abundant room for the expansion of her population. Her claims in China, a country already over-populated, and with its own sovereign rights and high civilization, are open to question. American opinion has naturally been made suspicious by Japanese claims in so many spheres. Sources of fiction between Japan and the Anglo-Saxon nations are likely to remain until she becomes a democracy, capable of co-operating with other democratic nations in the peaceful settlement of international problems."

The Brisbane *Courier* says that one of the really great needs in Australia and in America is enlightened public opinion regarding the foreign policy of Japan. The dominating feature of Japan's foreign policy, we are told, is a "protectorate over China and a kind of Monroe Doctrine over the Northern Pacific." For the time Britain has been admitted to that sphere, "by reason of the Alliance, and doubtless a renewal of the Alliance is regarded by shrewd Japanese statemen as a means of keeping Britain quiet." Russia no longer need be considered, we are told, Germany has been expelled from the Pacific, and France has no serious interests, but—

"America remains as the great barrier to Japanese ambitions, especially as America is forcing her interests in China and maintaining that the 'open door' in China shall be open to all. America, too, has frustrated Japanese ambitions to some extent in Shantung. That is the whole secret of the growing Japanese animosity to America, and whether we like it or not we are much concerned in the outcome."

The sharp division of opinion on the Japanese immigration problem that exists in Canada may be disclosed by the comparison of two editorial expressions. For instance, the Vancouver *Daily World* says:

"On the Pacific seaboard the natural increase of oriental races already in the country is as alarming as the influx of their yellow brethren from overseas. Every thirteenth child born in California is a Japanese, while more than 16,000 came into the United States last year in spite of the gentleman's agreement between the two countries concerned.

"These are great problems for our southern neighbors. For Canada the problem is greater still, increasing inversely to the size of the country's population. We now have as many as we can assimilate in our Northwest. We have as high a proportion of Asiatics to our own population on this coast as is safe."

On the other hand, the London (Ontario) *Free Press* warns against misstatements about the Japanese, and observes:

"The current objection to the Japanese is that they work for less wages and for longer hours, than Canadians think proper, and by so doing tend to reduce the standard awards of labor. These objections have held in the past. For the future they are offset by Great Britain's answer to the delegates' plea for racial equality. Other objections have been raised to the Japanese views of marriage, but they are ill-founded. The Japanese

marriage is a civil contract, and when the names of the contracting parties are duly registered they are as well married as are citizens of Canada who have gone before a magistrate or signed their contracts before church authorities. Trouble does not arise from this quarter—but there is danger from the Japanese attitude on divorce. Among the Japanese divorce is unnecessarily frequent and granted for trivial reasons. This ill-advised practice could be offset by clauses in the immigration laws to the effect that Japanese becoming residents of Canada must live by Canada's laws in all respects."

Canada's one line of procedure in the judgment of this journal is "to have the Japanese question thoroughly investigated, to make well-founded opinions and then see that these opinions have a chance to become operative."—*The Literary Digest*, Jan. 8, 1921.

"UNJUSTIFIABLE HOMICIDES" IN HAITI.—There are at least three ways, American editors have discovered, of looking at the report of the Naval Court of Inquiry, which gave a "practically" clean bill of health to that part of the marine corps which has been policing Haiti. The report is accepted as "the only finding possible, in the light of all the evidence," by most supporters of the administration; it is derided by radicals and Socialists as a "whitewash," the sort of investigation "so often staged by the British in Egypt and India"; while a third variety of opinion accepts both the investigation and the report with reservations, and calls for a Congressional investigation to lay bare the facts of our activities in Haiti.

The naval inquiry was inaugurated, as the press recall, largely to investigate charges made by Brigadier General George Barnett, former commandant of the marine corps. His letter, made public by the Navy Department some months ago, more than a year after it was written, accused certain members of the marine corps of "practically indiscriminate killing of natives." There was no proper ground for this statement, according to the report of the Naval Court of Inquiry by Rear Admiral Henry T. Mayo, which presents its findings of fact as follows:

"1. The court finds that two unjustifiable homicides have been committed, one each by two of the personnel of the United States Naval Service, and that sixteen other serious acts of violence have been perpetrated against citizens of Haiti during the same period by individuals of such personnel.

"2. The court finds further that these offenses were all isolated acts of individuals and that in every case the responsible party was duly brought to trial before a general court martial, convicted, and sentenced.

"3. The court has found no evidence of the commission of any other unjustifiable homicides or other serious unjustifiable acts of oppression or of violence against any of the citizens of Haiti or unjustifiable damage or destruction of their property caused by any of the personnel in question."

Shortly after General Barnett's accusations became public, Clifford A. Tinker, writing in *The Stars and Stripes*, a soldier weekly published in Washington, on the basis of the court-martial records, incidentally admitted the killing of prisoners without trial or other formality, in a way which aroused widespread protests against "Prussian barbarity," when it was practised by the Germans in the European War. This was quoted in *The Literary Digest* of November 13, 1920. The writers justified these killings on the ground that otherwise the marines would have been "handicapped by their prisoners." He also presented a circumstantial account of the killing of two Haitians, Leonard Placide and Destine Jean, by a marine who afterward went insane, whereas the court allots one "unjustifiable homicide" to each of two marines. The whole report is called "evasive humbug" in a statement issued by the National Association for the Advancement of Colored People, with headquarters in New York. "Obviously, the truth about Haiti cannot be brought out by any military inquiry," says this statement, which accuses the naval investigators of suppressing evidence. The statement suggests a Congressional investigation, and concludes:

"Most of the Haitians were killed in what were called *'caco* hunts,' in which fleeing people, often unarmed, were shot down by machine guns

whose bullets did not discriminate between the sexes. In fact, all the killings of the Haitians by marines were 'indiscriminate killings,' illegal and unjustified by international or any law other than that of force."

The Socialist New York *Call* and the liberal *Nation* are almost equally bitter and contemptuous. *The Call* suggests that a Naval Court of inquiry upon the acts of naval forces in Haiti might be regarded as a theme for a comic opera. Far and solidly on the other side of the fence are the New York *Tribune* and the New York *World*, respectively Republican and Democratic, but in thorough agreement on the subject of the marines in Haiti. "Such a charge was out of harmony with the record of the marine corps, with its high reputation for discipline and self-control," says *The Tribune*. "It has earned the gratitude of the Haitian people," comments *The World*. "It is well to have its services more fully known, not merely for the confusion of hostile critics, but in confirmation of the good name it has earned so often in other fields of duty." The New York *Evening Post* concludes an editorial of mild agreement with these encomiums with the observation that—

"This report does not dispose of the question of the justice of our rule in Haiti. President Dartiguenave from the beginning attributed small importance to the naval inquiry. His complaint is against our civil administration, the alleged shortcomings of which he lays to incompetent American officials. Nothing short of a Congressional investigation can get at the facts on this side of our activities in Haiti. All that we have had thus far are obviously biased and extreme charges and official denials."—*The Literary Digest*, Jan. 1, 1921.

MERCHANT MARINE

TRANSPORTATION BY WATER.—To the American boy, whose duty it is to maintain our flag upon the seas now that it has been restored there," runs the dedication of "The New Merchant Marine," by Edward N. Hurley, formerly chairman of the United States Shipping Board. He is proud of his work. "Our new merchant fleet as it floats to-day represents the most spectacular achievements in the history of this or any other country," he tells us, adding "Conspicuous among these achievements was the launching on July 4, 1918, of ninety-five ships in American yards—fully 50 per cent of which yards were not in existence a year before."

But what necessitated this frantic haste to build ships? We had ships a-plenty in the old days. "Almost the first industry established on our shores was the building of ships. By the middle of the eighteenth century twelve of the thirteen colonies lying along the Atlantic seaboard possessed regular shipyards, and each colony was producing from 2 to 137 bottoms a year," and everywhere on the high seas went Yankee sailormen. "In addition to covering established trade routes, they engaged extensively in pioneer operations. They sailed direct to the Cape of Good Hope and to Hindustan, Java, and Sumatra. Through the Dutch in the East Indies they carried on an early trade with Japan. Madagascar, New Holland, and New Zealand were among their regular ports of call. Theirs were among the earliest ships on the coast of South America and the West Coast of Africa."

As time went on, the Yankee fleets engaged more and more audaciously in trade. "A Boston merchant named Tudor obtained a monopoly of supplying ice to the city of Havana. Then, there was the American whaling industry. During this period, too, steam propulsion and its concomitant, the famous American clipper-ship, made their appearance. The first steam-vessel to cross the Atlantic was the *Savannah*, American-built and American-owned. The clippers were marvels of speed and strength. With them the twelve-day transatlantic passage was not uncommon; and nine-day voyages, not achieved by steam-vessels until thirty years later, are on record."

By 1850, or thereabouts, "our merchant marine had reached the zenith of its size, glory, and power. Our flag was on every highway of commerce. Our total ocean-going tonnage had reached 2,496,894. Even our new steam

fleet closely approached the size and exceeded the efficiency of England's." But dark clouds were gathering, and ere long came the Civil War, and "between the ravages of Confederate cruisers, the demoralization of our industries and commerce, the sale of our vessels into foreign registry, and the bankruptcy of many of our shipowners, almost half of our merchant marine was wiped out."

National pride stimulated a burning desire to regain our lost supremacy, but desire, in these matters, is not enough. It takes necessity, and our entrance into the World War brought that. Ships had to be built. They had to be built quickly—and were. "The Great War has left on our hands the nucleus of a large merchant fleet with which to re-establish our flag upon the seas. It consists of about 2311 vessels aggregating some 13,600,000 dead-weight tons. There is nothing elaborate about it, for it was built in an emergency for the grim purposes of war. It contains no ocean greyhounds; in fact, only twenty-six of the ships were designed to carry passengers. There are few tankers, colliers, and other special types; but, in the main, its units are carriers of bulk and general cargo, capable of turning up between nine and one-half and eleven knots an hour. They are good, strong vessels of better material, equipment, and workmanship than the old cargo vessels of Europe."

What, now, of the future? There are foreigners who can build ships more cheaply than we can. There are foreigners who can man and sail ships more cheaply than we can. If maintaining our merchant marine is to be unprofitable—that is to say, if outsiders can beat us at our own game—what powerful incentive remains for staying in that game? National pride? If so, how is national pride to translate itself into something practical and tangible? Foreigners have sometimes stimulated the growth of their fleets by grants of money to ship-owners—in a word, subsidies—and for a long time American publicists have urged us to do likewise. To this Mr. Hurley is strongly opposed.

All questions relating to ships and the deep seas are at present befogged with uncertainties. To what extent will our foreign trade develop? To what extent will our competitor's fleets develop? To what extent will private initiative replace governmental initiative in keeping up our new merchant marine? Affairs are at present so unsettled that it is difficult to predict. But meanwhile there is agitation for canals and for improved rivers, and in matters relating to inland waterways we deal with forces under our immediate control. Congress—or a state legislature—can say, "Let a canal be built," and nothing can prevent its being built, even though, as in the case of the New York State Barge Canal, it may cost $155,000,000.

In "American Transportation Problems," Samuel O. Dunn pays his compliments to the enthusiasts who "paint attractive pictures of great vessels loading at Chicago and St. Louis and steaming without transfer of cargo through the country to the Gulf, and thence to all parts of the world," and reminds us that "this main project is supplemented by numerous minor ones, including the deepening of the Mississippi River to St. Paul and of its various tributaries, and other rivers in all parts of the country; the construction of a ship-canal to connect the lower end of Lake Michigan with Lake Erie; the construction of a ship-canal from Lake Erie to the Atlantic Ocean, etc. The three chief arguments for this plan are (1) that it would cheapen transportation; (2) that it would regulate railway freight-rates; and (3) that it would provide in the best way needed additional facilities of transportation."

How sound are these arguments? As Mr. Dunn goes on to say, "there can be no question that well-managed steamship lines in our coastwise and Great Lakes traffic can generally haul goods more cheaply than railways. The case of *artificial* water-ways, including under this term both canals and improved rivers, is very different. Expenditures analogous to those for the construction and maintenance of a railway's roadway must be made on them; and the expenses of operation caused by the physical limitations of their channels are comparable to those caused by the limitations of a railway's track." These are serious objections, and, as Mr. Dunn goes on

to say, "even if the Lakes-to-Gulf waterway were dug twenty feet, or even thirty feet, it is not probable it would be used by lake or ocean steamships. A lake or ocean vessel is poorly constructed for navigating a canal or tortuous river; its ratio of length to beam is too great and its rudder power insufficient to keep it from frequently running into the banks except when moving very slowly."

Mr. Dunn edits *The Railway Age Gazette* and perhaps might be regarded by some as, on that account, more favorable to railways than to waterways. Railways are not supposed, at any rate, to love canals, or improved rivers, or any type whatsoever of inland waterway. But no such charges of special pleading will be brought against Charles Whiting Baker, consulting editor of *The Engineering News-Record*, and he agrees pretty closely with Mr. Dunn when he sets forth his views in "What Is the Future of Inland Water Transportation?" There we read that "traffic on nearly all inland waterways has all but disappeared. With few exceptions, the competition of waterways with railways is no longer of any consequence. The primary cause of the decline of the waterways is the extraordinarily low cost at which the railways of the United States are able to handle low-grade bulk freight, which is the only class of freight on which the waterways can hope to compete with railways."

By way of conclusion he says, "The only waterways which promise public benefit are those whose terminal expenses favor the waterway instead of the railroad. A deepened St. Lawrence River connection between the lakes and the Atlantic and a ship-canal across New Jersey are the two waterway projects which best deserve attention."—*The Literary Digest*, Jan. 1, 1921.

ADMIRAL BENSON'S REPORT GIVES MUCH USEFUL INFORMATION.—According to the annual report of Chairman Benson of the Shipping Board, the United States on the completion of the government's shipbuilding program by 1922 probably will have as much ocean-going tonnage as all the other countries combined, with the exception of Great Britain.

In the course of the fiscal year 1180 finished ships of 6,379,823 deadweight tons were delivered, exceeding all records. They were built without overtime or other aids to rapid production.

American vessels are now sailing in 229 separate services. They carried 44.6 per cent of the nation's foreign commerce last year as compared with 9.7 per cent before the war, the report said.

The government fleet in operation June 30 consisted of 1294 steel vessels plying to all quarters of the globe, including 508 to Northern Europe and 126 to Southern Europe. In the transpacific service there were 163 vessels, and in the South American 138.

Forty-one direct service lines have been established to South and Central America from nine ports on the Atlantic Coast, four on the Gulf and two on the Pacific Coast.

Discussing the wooden fleet, Chairman Benson said the maximum number in operation was 240 during April. In June there were 170 at work. Government tank steamers carried 3,641,362 tons of oil in the course of the year.

Nearly all seized German cargo craft have been sold or chartered with option to purchase, while all but eleven of the German passenger ships were disposed of in the course of the year.—*The Nautical Gazette*, Dec. 18, 1920.

THE DEVELOPMENT OF WELDED SHIPS.—It is scarcely believable that a wide-spread movement in favor of the adoption of electrically-welded ships will not, in due course, attract a sufficiently large number of skilled mechanics to dissipate the present objection to welding on the part of the majority of iron-workers.

As in other departments of shipbuilding, thorough mastery of the welding art, can only be obtained by actual experience in the various branches of the trade, and not in so-called welding schools. Hence the welders

should be selected from the handiest ship workers, boilermakers, and forge shop helpers, men who have learned heat treatment and how to handle tools over several years. The degree of intelligence they show in handling the arc will indicate the measure of their success as welders.

It is suggested that in the preparation of drawings and shop orders for the fabrication of welded structures, the designer should keep constantly in mind the smaller dimensions of the plating required because of substituting open butt joints for the customary riveted laps. He should also take advantage of the many opportunities for eliminating angles and other junction members so essential for riveted jointures, but wholly unnecessary for electrically-welded seams. It is also recommended that the designer consult freely with the welding engineer when developing the lay-out of new work as, between them, more efficient and economical results are secured. (*Pacific Marine Review*, Sept., 1920).—*The Technical Review*, Dec. 14, 1920.

EFFECT OF DEPTH OF WATER ON RESISTANCE.—Experiments have shown that the resistance of a ship may be influenced by the presence of the bottom at high speeds, when the depth is so great as twenty times the draft.

The author sets out to answer the following questions: (1) Where does the increase in power begin? (2) Where is it greatest? (3) How great is the maximum increase? (4) Where do the resistance curves for deep and shallow water cross again? (5) How great is the subsequent reduction in power? But he confines himself chiefly to questions (2) and (3). From an examination of trial results of ships of different sizes it appears that there is a critical speed for each depth of water at which the increase in resistance is greatest. This speed depends only on the depth and can be obtained approximately from the formula—critical speed $= 7.1\ \sqrt[3]{\text{depth of water}}$. The point of intersection of the resistance curves for shallow and deep water lies at such high speeds as can only be reached by very fast warships. The amount of the increase of resistance has been found to depend on the ratio

$$\frac{\text{Area of midship section}}{\text{Breadth of ship} \times \text{depth of water}}$$

which may be called the "contraction of the area of flow," It is quite independent of the value of the critical speed. Model experiments show similar results, but the influence of the restriction caused by the sides of the tank is felt as well as that of the bottom, and the formula for the critical speed becomes $2.54\ \sqrt[2.78]{\text{depth of tank}}$, which is different to that obtained from actual ships. The amount of the increase, however, is still found to depend on "the contraction of the area of flow." It is important for comparison between models and full-sized ships that curves for deep and shallow water in both ship and model cross at the same corresponding speed. Thus it is possible to apply the law of comparison with sufficient accuracy if the position of the maximum increase is adjusted so as to agree with the critical speed for the real ship in the depth of water to be used on the trials. The percentage increase in power at this point will be that obtaining in the model at the critical speed in the tank. Thus a displacement of the hump on the resistance curve can be made, while keeping the crossing points fixed.—*The Technical Review*, Dec. 21, 1920.

CONCRETE SHIPS.—From the experience of the U. S. A., reinforced concrete ships are proving satisfactory.

Vibration in these vessels is smaller than in steel ships, and the period of roll is longer, a very desirable quality, due to the fact that these vessels have a greater moment of inertia owing to the weight of the hull being heavier.

On the other hand, experience shows that they are not so capable of standing hard knocks, the cement breaking away. Where a blow on a steel ship would only bend a plate, in a concrete ship it results in a large

area in the neighborhood of the point of impact being damaged. It is true, however, that the repair of the damage can be easily and quickly carried out. For heavy cargoes, iron and oil, where the maximum weight of the cargo is reached before the hold capacity is filled, the steel vessel has the advantage; but with ordinary cargo, such as general goods, cotton, fruit, etc., the concrete ship has the advantage, as in the steel ship the vessel is filled to her capacity before the max. d w. load is reached. Concrete ships can be built as quickly as those of steel, and with longer experience the time may be shortened, and also the cost reduced. The vessels in service have not shown any special indication of deterioration that would tend to reduce their life. (*Rivista Marittima*, July-Aug., 1920.)—*The Technical Review*, Dec. 21, 1920.

AERONAUTICS

THE DEVELOPMENT AND CONSTRUCTION OF THE CAPRONI AEROPLANES.—The author gives full details of the developments of the Caproni aeroplanes, and compares their characteristics and performances with German machines of similar construction.

The author illustrates and describes the various machines built by Caproni, beginning with the 100-horsepower Gnome-engined biplane, then the 100-horsepower Fiat-engined biplane, and the 150-horsepower Isotta Fraschini-engined biplane. He then deals with the successive 3-engined designs of 200-300-horsepower up to 600-900-horsepower biplanes reconstructed for commercial use, and finally, he describes at length the various triplanes built for commercial use up to 2000 horsepower. Tables are given showing the respective time of flight, fuel consumption, distance of flight and load-carrying capacity of the various types.

The author draws the conclusion that the cause of the relatively low carrying capacity is due to the fact that Caproni is aiming at a light net weight of machine and in order to achieve this requires many struts and a complex bracing system, which by greatly increasing resistance, reduces the ratio of lift to resistance, resulting in smaller load-carrying capacity. The German designers rather prefer a greater net weight of the machine by strengthening the construction without the use of many struts and bracing wires, and thus increase the ratio of lift to resistance. (*Der Motorwagen*, Sept. 20, 1920.)—*The Technical Review*, Dec. 21, 1920.

THE GERMAN AIRSHIPS "L-64" AND "L-71."—An article dealing with some of the more interesting points of construction of these vessels, which were handed over to Great Britain.

L-64, the older of the two, which was actually engaged in raids over London, has four gondolas equipped with 300-horsepower Maybach engines; *L-71* has six gondolas similarly equipped. For the exhaust system a novel arrangement has been adopted whereby a large saving in weight is effected. Bolted to the exhaust ports is the exhaust manifold, which consists of mild steel pressings soldered together. Both manifold and exhaust pipe are entirely enclosed in an aluminum jacket, and the exhaust outlet, which is turned aft towards the propeller, is used to induce a strong draft of air through the space between the jacket and pipe, effectively cooling the system. (*Automobile Engineer*, November, 1920.)—*The Technical Review*, Dec. 21, 1920.

COAST-TO-COAST FLIGHT IN 24 HOURS PLANNED.—An attempt to fly 2079 miles from Florida to California in an aeroplane in 24 hours will be made February 22 by Lieutenant Alexander Pearson, Jr., Major Henry C. Pratt, air officer of the 8th Corps area, announced Lieutenant Pearson who won the transcontinental air race last winter.

The flight will be made in three "hops." The starting point will be Pablo Beach, Jacksonville, Fla. The first hop of 804 miles, will be made to Ellington Field, Houston, Tex.; the second from Ellington Field to El Paso,

a distance of 660 miles, and the third is scheduled from El Paso to Rockwell Field, San Diego, Calif., 615 miles.

The flight will be the first attempt to cross the continent for a continuous speed record, the two necessary stops only requiring 45 minutes.—*The Aerial Age Weekly*, Dec. 27, 1920.

"NC" SEAPLANES FOR FLEET OPERATIONS.—Five of the large *NC* seaplanes have been assigned to operate with the U. S. Navy fleets, three on the Atlantic and three on the Pacific. These seaplanes, carrying a crew of five men each, will be employed on scouting problems and long distance work, for which they are well adapted, being fitted for navigation on the surface and with the radio direction compass. The definite program for their employment is being worked out by the Fleet Air Detachment commanders, Capt. George W. Steele, Jr., U. S. N., of the U. S. Atlantic fleet, and Capt. H. C. Mustin, U. S. N., of the Pacific fleet. The *NC* seaplanes will have destroyer tenders for these operations. This is the first time *NC* seaplanes have been used.—*The Aerial Age Weekly*, Jan. 3, 1921.

ENGINEERING

THE ELECTRIC-ARC WELDING OF STEEL: THE PROPERTIES OF THE ARC-FUSED METAL.—A fusion weld is fundamentally different from all other types in that the metal of the weld is essentially a casting. The arc-fusion weld has characteristics which are peculiar to it alone. A knowledge of the mechanical properties of the arc-fused metal which is added during the process of welding is fundamental in the study of arc-welding. The mechanical properties as revealed by stressing in tension were determined upon specimens (0.505 inch diameter, 2 inch gage length) cut from blocks of arc-fused metal prepared under conditions similar to those met in welding. Additional specimens were also prepared by expert welders outside of the bureau and submitted for comparison with those prepared by the bureau.

Two types of electrodes, a "pure" iron and a low-carbon steel, were used. During fusion the composition changes considerably as the carbon and other elements are eliminated. The two types of electrodes become very much alike in composition. In each case a considerable percentage of nitrogen is taken up.

The mechanical properties of the arc-fused metal as measured by the tension test are essentially those of an inferior casting. The most striking feature is the low ductility of the metal. All of the specimens examined (about 70) showed evidence of unsoundness in their structure, tiny enclosed cavities, oxide inclusions, and lack of intimate union. These appear to be a necessary consequence of the method of fusion as now practised. They determine almost entirely the mechanical properties of the metal. The observed elongation of specimens under tension is due to the combined effect of the numerous unsound spots rather than to the ductility of the metal.

The material is, however, inherently rather ductile, as may be shown by the changes produced in its microstructure by cold-bending.

A characteristic feature of the microstructure of the arc-fused metal is the presence of numerous microscopic plates within the ferrite grains. These persist in the metal upon prolonged heating, for example, 6 hours at 1000° C. in vacuo were not sufficient to remove them. The various lines of evidence available indicate that they are related to the nitrogen-content of the metal.

The microscopic examination indicates that there is but little, if any, relation between these so-called "nitride plates" and the path of rupture produced by tensional stresses. The effect of the grosser imperfections of the metal is so much greater than any possible effect of these plates in determining the mechanical properties that the conclusion appears to be warranted that this feature of the structure is a matter of relatively minor importance in ordinary arc welds.

Judged from the properties of the metal after fusion, neither type of electrode used appears to have a marked advantage over the other. The use of slight protective coatings on the electrodes does not appear to affect the mechanical properties of the arc fused metal materially in any way. The specimens were prepared in a manner quite different from that used ordinarily in electric-arc welding and so do not justify specific recommendations concerning methods of practice in welding.—*The Franklin Institute*, January, 1921.

SHIPYARD TESTS PROVE WELDING WILL SUPERSEDE OLD METHODS.—In view of the sensational notices that have been issued from time to time, regarding the miracles of electric welding, the actual fact test becomes important. New England's greatest shipyard, Fore River, has been giving over a year's time to trying out the actual, practical, enduring and time-saving and cost-cutting worth of welding by the oxy-acetylene method.

While it has been rumored that "riveting is ended in this yard and o-a is to take its place," it may be remarked that the double, and "triple-curved," plates on certain parts of submarines, etc., are not welded as YET. But testing for a considerable period has developed the following as the result of Fore River's experience.

When the plates come into the steel mill and are taken off the moulds the oxy-acetylene contrivance, known among the men as the burning torch, cuts openings for hatches and door, pares down edges to conformation with lines of the moulds and cuts the lightening holes and innumerable other cuts and openings that are too costly or too difficult to make with the punches, shears or drills.

Torches in the Smithy.—At the smithy building, the "burning torches" make holes in girders, notch frames and angles, split steel beams, and perform numberless jobs for or in connection with the smith work. Gun foundation rings are here joined, blower trunks and smokestack rings, add pieces to staples and other important basic or incidental work formerly done by smithy, driller or chipper now is largely done by the burner.

Gradually it has gotten so that hither-to-ridiculed uses of oxy-acetylene methods have been found by repeated tests to be thoroughly practical. Trolley supports and boat davits are split by the burner and bent into the required shape by the anglesmith, then are swiftly welded into permanent pieces by this new method. Stiffener-bars are likewise split and welded, condenser frames are formed and false corners plugged and made solid pieces. Spot-welding machinery is now employed to a great extent on fundamental pieces, in many lines doing away with the use of rivets entirely! (I put an exclamation point here because, in actual shipyard work, it is known to be wonderful that riveting can even partially be done away with!)

Irregular Shapes Made.—Go through an inspection of the assembling space and you find renewed evidence of the indispensability of the oxy-acetylene device. Irregular or special shapes and forms are fitted with special shapes cut out or fitted by the burners. Welders pad bulkheads, join bars, tighten corners and perform an hundred of the emergency, special-need and otherwise-impossible feats that are constantly required, despite the finest of planning and blue-printing, in every craft that leaves the plant. Rings are secured with welded strips that are drilled for the requisite number of rivets.

The giant tanker Baldbutte which recently went into commission from Fore River is the most up-to-date specimen of the all-round use of the oxy-acetylene method. It is evidenced to a remarkble degree all through this huge craft.

Before the ship was anywhere near ready for launching the burners served numerous departments by cutting holes and areas for pipe systems, electrical systems, ventilation, etc. In the alteration of plans—one of the puzzling and inevitable brain-rackers for shipbuilding experts—it may now be said that the burning torch is the main, and in some cases, the only, dependence for making alteration possible.

Use in Naval Construction.—While destroyers are, to most visitors, pretty well packed with details and variety of equipment, the submarine is a veritable tube of costly, delicate and compactly-stored machinery. Thus a submarine which, in the rough, is worth $1,000,000 goes out of the yard with devices that bring its price up to $4,000,000.

Back in the shops welding plays as consuming a part as it does in a finished tanker or submarine. Welding has superseded riveting in sheet metal departments for making ventilating pipes, inspection tanks, bins, racks, frames, windshields, gravity tanks, drums, heads, cylinders, drain boxes, gear covers, port casings, etc.

And in conservation—few realize how welding has revolutionized things! Parts of broken tools, of the costliest, high-speed steel are welded on to inexpensive shafts and thus saved for weeks or months of practical service when they would, otherwise, be consigned to the junk pile. Pneumatic and electrical tools and pieces are put back into efficiency by the oxy-acetylene route.

Go to the Baldbutte and find that the hatches over the engine-room, boiler-room mess and galley are welded! Awning stanchions, railing stanchions and even the staff from which the flag floats are fastened in place by the burning torch method.

And steadily is the manifold necessity and use of o-a developing. Developing as severe testing and experimenting prove that it positively IS the quickest and most solid method. While riveting has not been "driven from shipyards," it does seem, to one familiar with what is now going on there, that it is steadily being driven toward the discard!—*The Nautical Gazette,* Dec. 18, 1920.

POWDERED COAL FOR POWER-PLANT BOILERS.—Recent successful application of powered coal to steam boilers seems to mark an introduction to a period of transition in the art of burning coal under power-plant boilers. This transition may be similar to that through which the steam prime mover passed during the last fifteen or twenty years. During this period the steam turbine in large power-plant service has supplanted the reciprocating engine, although it is true that there are many more steam engines made and sold to-day than 20 years ago. It seems probable that within a few years powdered coal in a similar manner will supplant in certain fields the mechanical stoker, while in other classes of service the stoker may extend its service because of its peculiar adaptation, just as the steam engine is holding its own against the steam turbine in its particular field.

There are in the United States several plants burning pulverized coal with sufficient success from the viewpoint of over-all efficiency, service and reliability of operation to warrant investigation of the possibilities when new plants are under contemplation. The over-all operating efficiency of a plant using powdered coal is higher than it is with other methods of burning. The gain in economy is due mainly to low heat losses in the chimney gases, an unusually small amount of combustible in the ash and to the fact that no coal is burned during banking hours.

In the chimney gases the heat losses are low because powdered coal can be burned with little excess air and it is easy to maintain the right proportion of coal and air fed into the furnace. The air infiltration into the setting is small because only nominal draft is required. Owing to the low excess of air a relatively small volume of gases needs to be moved through the boiler, and there is no fuel bed to impede the passage of the air to the furnace.

With proper furnace and burner design the combustible carried away with the ash is so small that the loss due to this cause need not exceed 1 per cent of the heat in the coal fired. No coal need be burned when the boilers are banked, as usually the fire can be lighted and made effective within less than five minutes.

As the excess of air and the completeness of combustion can be controlled easily, all coals give equally good service and efficiency. The

evaporation is directly proportional to the heat value of the coal, so that coal can be bought on the B. t. u. basis. With a well-designed and operated powdered-coal furnace it is possible to remove the ash without hindrance to operation. Comparatively little repair work on the furnace lining should be necessary. It has been said that boilers fired with powdered coal are limited in capacity. The capacity that can be developed efficiently depends entirely upon the size and proportion of the furnace. This is true of all other methods of burning coal, although perhaps this fact is not appreciated generally by power-plant designers. In a properly designed powdered-coal furnace the ordinary bituminous steaming coal can be burned almost completely at rates of combustion up to two pounds of coal per cubic foot of combustion space. It may seem that powdered coal requires large combustion volume, but it should be borne in mind that all the space occupied by the ashpit and air ducts in the stoker installation is available as combustion space in a powdered-coal furnace. It is a fact that stoker furnaces installed in the past have had entirely too little combustion space, but during the last few years the necessity and advantages of large combustion volume has been appreciated by the more progressive stoker manufacturers, and they now demand that boilers be set high above the floor to give large combustion volume over the stokers.

Another objection frequently raised to powdered coal is that a large part of the ash is carried away with the chimney gases and deposited in the neighborhood of the plant. This objection is not nearly so serious as represented. In well-designed plants much of the ash can be deposited at the bottom of the furnace, in the chambers under the rear part of the boiler, in specially provided pockets in the smoke flue and at the base of the stack. Experiments have shown that not over 15 per cent of the ash in the coal need be discharged into the atmosphere with the chimney gases. This quantity compares favorably with that carried away from other types of furnace. From well-designed and well-operated powdered-coal plants the dust is very fine and is carried a long distance. It is brought down only by rain and deposited over large areas in quantities so small that it cannot be observed. It is like fine beach sand and does not smudge.

Another objection usually made against powdered coal is that the cost of preparation is too high and nearly offsets the gain in boiler efficiency. This objection might have been justified in some of the first attempts to burn pulverized coal with poorly designed furnaces and burners. From these experiments conclusions were made that in order to burn powdered coal successfully it was necessary that the coal should contain less than 1 per cent of moisture and that at least 85 per cent of the coal should pass through a 200-mesh screen. Of course such preparation of coal would be costly. It seems now possible that the cost of pulverizing coal need not be in excess of the cost of supplying air under pressure to forced-draft stokers.

The pulverizing mills will stand considerable improvement and simplification. Much of the energy used in driving these mills is spent in useless work, and it is probable that mills will be developed using two-thirds or even one-half of the power now required to pulverize coal and thus further reduce the cost of preparing the fuel.

It was not until about three years ago that the work of successfully burning pulverized fuel under boilers in plants where the efficient generation of steam was absolutely essential was accomplished. From that time until about five months ago there was nothing radically different in the methods employed. Beginning last August, however, some courageous steps were taken to ascertain to what limits the old order of things could be changed with a view to improving both operating conditions and efficiency. As a result some discoveries have been made and acted upon, and it would appear as if still further developments are imminent, so that the future looks full of possibilities for the improvement of the preparation and of the methods of burning pulverized coal.—*Power*, Jan. 4, 1921.

ALUMINIUM ALLOYS.—The metallography and physical properties of a number of alloys of aluminium with copper, magnesium, iron, nickel, manganese and zinc are described, and a number of practical notes are included.

A number of micrographs of aluminium alloys are given, the structures being examined and accounted for, theoretically. It is shown, for example, that the copper compound $CuAl_2$ formed dissolves in solid aluminium up to about 4 per cent of copper at 500° C. Above about 4 per cent, a eutectic forms between $CuAl_2$ and aluminium-$CuAl_2$ solid solution. The variable solubility of the $CuAl_2$ with change of temperature makes it possible to change the properties of these alloys by suitable heat treatment. In the case of iron-aluminium alloys when about ½ to 2½ per cent of iron is added, $FeAl_3$ is formed as needle-like constituents, which have a strengthening effect upon most aluminium castings by virtue of the fact that the normal eutectic network is made less continuous. As the fracture in nearly all castings occurs in the eutectic network, the $FeAl_3$ needles make the path of rupture greater and increase the breaking load, as well as giving a higher elongation.

When 2.75 per cent copper, 7 to 8 per cent zinc, and about 1½ per cent of iron is added to aluminium, the iron needles form in several places; $CuAl_2$ is also formed, and the zinc is present without forming a complete network. This alloy is strong and ductile, having an average tensile strength, in the green-sand cast state, of about 12 tons per sq. in., with an elongation of 4.5 per cent.

The phenomena of growth and ageing are described at some length; it is stated that in the case of the old No. 12 alloy, sand cast, that the strength and ductility changed appreciably even after only 24 hours, the change persisting for several months. Usually the strength slightly increases and the ductility decreases. In the case of copper-aluminium alloy, as cooled in the ordinary methods of production, upon reheating to a temperature of 300° C., a permanent increase in volume always takes place; petrol engine alloy pistons all experience this growth.

The effect of zinc in increasing the tensile strength is shown graphically; from the curve it is evident that with pure aluminium (cast) the tensile strength is 13,000 lbs. sq. in., with 3 per cent zinc, 14,000 lbs. sq. in.; with 7 per cent zinc, 18,000 lbs. sq. in.; and with 12 per cent zinc, 25,000 lbs. sq. in. The elongations for the above values are 19, 18, 14 and 7 per cent respectively on 2 inches. With 10 per cent of copper the tensile strength is increased from 13,000 to 20,500 lbs. sq. in., and the elongation is reduced from 19 to 0.6 per cent.

Temperature curves are given for two types of alloy, one being known as 145 Lynite, which consists of 2.75 per cent copper, 7 to 8 per cent zinc, and over 1 per cent of iron. The tensile strength at 0° C. is 30,000 lbs. sq. in., whilst at 100°, 200° and 300° C. it is 25,000, 16,000 and 9000 lbs. sq. in. respectively. The corresponding elongations on 2 inches length are 8, 10, 14 and 21.5 per cent respectively. A comparison is also made of the stress strain values of cast aluminium alloy with those of machine steel, and results of fatigue tests made on these metals are discussed. It is stated that an aluminium alloy casting similar to the one last described will break after 500,000 reversals, when stressed to 14,000 lbs. sq. in.; when stressed to 8500 lbs. sq. in. it will break with 16,000,000 reversals. But mild steel, having a tensile strength of 65,000 lbs. sq. in., a yield point of 30,000 lbs. sq. in., and elongation of 30 per cent, will break with 16,000,000 reversals, only, when stressed to 12,000 lbs. sq. in.

The author proceeds to describe the foregoing alloys of aluminium, their properties and methods of working. (Z. Jeffries, Paper read before the Detroit Section, Society of Automotive Engineers, *Aviation*, Oct. 1, 1920).—*The Technical Review*, Dec. 14, 1920.

RADIUM—A NEW ELEMENT IN THE SAFETY MOVEMENT.—Radium, the most mysterious and most powerful element known to science, which has the

greatest power of all discovered sources of energy, has now been linked with the Safety Movement and will lend its power to the prevention of avoidable accidents.

Radium is best known to the world through its curative properties in the treatment of cancer and through its commercial value in making radium luminous material. The power and curative properties of radium were made known only a few years ago through the efforts of a Polish woman scientist, and a French and an American professor. Radium is now used in the treatment of thousands of cases of cancer annually, with encouraging results.

Radium's rôle in industry as a life saver is less spectacular, but perhaps even more important than it is as a therapeutic agent. The great mass of accidents in factories, in mines and in other industrial institutions where darkness is a creator of danger, are being eliminated through the newest invention of science—radium luminous material. Radium illuminated watches are familiar articles. The same material that illuminates these is now being employed in great factories on all power line switches where fumbling might mean electrocution to the operator.

Electric switches are often set in places which are unlit. This includes electric lighting equipment which is usually visible only after the light it controls has been turned on. A spot of radium luminous material on the bottom of a switch makes them easily located in the dark, so that in emergency they may quickly be made use of.

Likewise, a fire alarm or a fire extinguisher is deprived of a good deal of its efficiency, through being invisible in the dark. Radium luminous material acts as a quick locater for them.

While radium is the most valuable element in the world—a gram of radium costs $120,000, as opposed to $150 for an ounce of platinum. So powerful is it when mixed with other materials that even the minutest particle is effective in making material self-luminous for years. It is this quality which makes radium luminous material commercially possible.

The great value of radium is due to its scarcity and to the great difficulty in isolating it after it has been found. Much of the radium of the world is now found in America, in mineral deposits of carnotite. A great portion of this comes from the Undark Radium mines in the Paradox Valley of Colorado.

The ore is found in narrow seams in the ground. It is sorted and packed in one hundred pound sacks and transported sixty miles to the nearest railroad station on the backs of burros and mules. Thence it is shipped in carload lots 2900 miles across the continent to an extraction plant in Orange, N. J.

Two hundred fifty tons of ore treated with an equal amount of chemicals and water yields one gram, which is about the size of a pin head.—*Industrial Management*, December, 1920.

THE DESIGN OF DIESEL ENGINES.—Otto Alt, chief engineer of the Germania Shipyard (Krupp's) outlines the progress hitherto made in the design and construction of Diesel engines and forecasts the main trend of design to be followed by Krupp's.

After particulars are given of the Diesel engines constructed for certain German U-boats, reference is made to the fact that the firm intend to specialize mainly in the four-stroke type of engine.

Dealing with the problems of design, reference is made to torsional vibrations of the engine shafts and the work carried out by Gümbel and others, from which the following conclusions emerge: (1) The shafts of marine engines should, where possible, be so dimensioned that the range from 0 to the maximum revs. is as free from vibrations as possible. In this connection it is sufficient for the critical speed of the second degree and sixth order of, say, six-cylinder engines to be about 20 per cent above the maximum speed. (2) If dangerous critical speeds are still present

within the given range, they should be so distributed as to be below the working revolutions.

As regards lubrication and the danger of carbonized oil getting into the bearings, Messrs. Krupp get over this difficulty in the case of uncooled pistons, by making the piston head double, *i. e.*, having a dummy head outside which gets red hot, the inner head remaining cool. Special oil purifying plant should be provided to filter dangerous particles. In the case of the larger 2-stroke engines the pistons are water-cooled. In order to prevent water getting to the oil, the manifolds for the inlet and outlet of the cooling water are, in the case of Krupp engines, placed outside the crank chamber.

The port method of scavenging has been successfully applied to large two-stroke Diesel engines, so that it is probable that the valveless two-stroke will entirely replace the valve type in future.

As regards the combustion process in the Diesel engine, the three usual methods of fuel injection are discussed, viz., compressed air, spring-pressure, and separate chamber or retort. The writer is of opinion, for reasons set forth by him, that the spring method is only suitable for the lower-duty engines. The separate hot-chamber or retort method, due to Steinbecker, has been tried by Krupp's, with satisfactory results. In this method the fuel is introduced (by a fuel pump placed in the cylindrical head) into the injection channel when the piston is about 3° from the upper dead center. Part of the fuel passes with the air into the retort, which is filled with very hot air at a pressure of about 30 atm., and here it ignites and raises the pressure in the retort to about 60 atm. This rise of pressure blows the fuel admitted into the injection channel by the pump into the cylinder. The question of oil-vapor formation is discussed, together with the ignition temperatures, the final compression pressures and the final compression temperatures of vaporized oils. The means of preventing overheating are also considered. A simple criterion for the heating to be expected and the choice of a design to meet it seems to be the quantity of heat transmitted per square meter of combustion chamber area per hour. This is derived from the equation:

$$q_0 = \delta \times q \times n \times D \times p_e,$$

where q_0 is the quantity of heat, in cals., passing through each sq. m. of surface of the combustion chamber per hour; δ, a coefficient depending on the number of cycles, the piston stroke and the time of injection; q the quantity of heat, in cals., passing through the area of the combustion chamber per hour per h. p.: n the r. p. m.; D the diam. of cylinder in meters, and p_e the mean effective pressure in kg./sq. m.

The writer is of the opinion that it is not possible to increase the efficiency of the fuel energy in the Diesel engine above the maximum of 35 per cent already attained

In conclusion, the question of increased efficiency or duty and the pros and cons of the two- and four-stroke cycle systems are discussed. (*Krupp'sche Monatshefte*, Sept., 1920.)—*The Technical Review*, Nov. 23, 1920.

PROPOSED SEVERN BARRAGE.—A project that the *Engineer*[1] (London) refers to as "a somewhat grandiose scheme" is the utilization of the ebb and flow of the tides in the River Severn for the production of electrical energy. Briefly stated, the proposal is to construct a dam across the river near the place where the tunnel now crosses under it, and by the employment of turbines and electric generators to provide a continuous supply of energy in excess of half a million horsepower during a ten-hour day with a peak capacity of over a million horsepower. The necessary storage feature is to be provided by using excess energy at times of maximum production to pump large volumes of water into a high-level reservoir, the power produced by this water in falling again to sea level being

[1] Note see Current Naval and Professional Papers List.

employed to produce current to fill up the valleys that would otherwise exist in the normal production curve. It is estimated that the potential tidewater power on the Severn with a maximum rise and fall during spring tides of about 30 feet is considerably greater than that of Niagara Falls and largely in excess of the water power of the United Kingdom put together.

There are available four principal outlets: (a) To local manufacturing interests, for which the surrounding country is admirably adapted geographically; (b) to the industrial area of South Wales, all of which lies within a radius of 50 miles of the proposed development; (c) to the vicinity of Birmingham, which is approximately 70 miles distant, and (d) to London, 115 miles away, where the Severn power would be used to relieve the peak load of local generating installations.

The proposed development has been formulated by the Civil Engineering Department of the Ministry of Transport, the names of Sir Alexander Gibb and Messrs. J. Ferguson and T. R. Menzies being mentioned as principally responsible for the engineering and economic features involved. It seems that the Ministry of Transport is interested in the matter because of the lack of sufficient railway communication between South Wales and other parts of the kingdom and the need of access over the Severn estuary for vehicular traffic. Hence the idea of a low-level crossing to accommodate both rail and road traffic and to be used also as a dam or barrage for impounding water to be employed for the production of electric energy.

An important feature of the proposed development is a locked basin for shipping purposes over 27 square miles in extent, suitable for the accommodation of ocean-going vessels, which would be usable at all tides. A locking basin capable of taking the largest ships is to be constructed on the line of the navigable channel and intersecting the barrage, and it is proposed to lead ships into and through it by electric locomotives in a way similar to that employed in the Panama Canal. The railway and road traffic will be passed over one end or the other of the basin by means of lifting bridges, operating in such a way as to insure that there will be no delay either in railway, road or river traffic, the railway being for this purpose duplicated in the form of a loop where it crosses the locking basin.

As to the financial aspect, the *Engineer* says: "No figures are given in the official document as to the first cost of the scheme as a whole, but published guesses at it have varied between £8,000,000 and £30,000,000. It is stated, however, that the estimated cost for generation at present-day prices is a little over ½d. per Board of Trade unit. It is claimed that, incidentally, the utilization of the power derived from the operation of the scheme would effect a saving in coal consumption of from three to four million tons per year, which quantity would become available for export and would result in the amelioration of the living conditions in the great industrial areas."—*Power*, Jan. 11, 1921.

ORDNANCE

AUTOFRETTAGE METHOD OF GUN CONSTRUCTION.—Investigations are on hand by the U. S. Ordnance Department with a view to comparing the merits of the "autofrettage" method of constructing guns with the more ordinarily used built-up and wire-wrapped methods.

In the autofrettage method of gun construction, the gun may be constructed in one piece. Before the bore is finally completed, hydraulic pressure is applied, sufficient to cause an actual expansion of the gun. The elastic reaction which takes place after the hydraulic pressure is removed places the inner parts of the wall of the gun under compression and the outer part under tension, which is the same general effect as is obtained in the built-up or wire-wrapped constructions. The autofrettage method, if satisfactory, will probably prove cheaper than either of the other two. Furthermore, it will materially quicken the speed of production, and it

may be possible to obtain a gun of equal power but lighter weight. (*Military Engineer*, Sept-Oct., 1920.)—*The Technical Review*, Oct. 26, 1920.

THE WARSHIPS OF TO-MORROW.—The writer considers the problems of types in a very thorough manner and with special reference to the lessons taught by the late war.

He infers that the day of the large battleship is not over. A less caliber than 380 mm. for capital ships is not to be considered; the ideal ship should carry a maximum of 12 guns disposed in four triple turrets rather than in three quadruple or six twin turrets; six is the minimum large caliber guns that should be mounted, so as to ensure effective fire control and good shooting. Despite their effect on stability, superimposed turrets should be retained so as to secure the maximum radius of action ahead and astern. He advocates a secondary armament of 152 mm. guns well protected, and an anti-aircraft armament consisting of six guns about 100 mm. caliber, with a number of machine guns for defence against aircraft that may fly low. Above-water torpedo tubes should be mounted in triple or double units to the number of 7 to 12. Armor, both horizontal and vertical, should be as heavy as possible, compatible with the tonnage of the vessel and its speed. The writer admires the system of protection in the German ships, which enabled so many of them to make port after suffering serious damage from shells, torpedoes, and mines. Speed is a question about which there is some difference of opinion, but for a power which might have to wage a war of attrition (Italy, for example), he recommends that their capital ships should be heavily enough armed and protected to stand up against the enemy's battle cruisers. They might have a less speed than the latter, but must have three or four knots in hand compared with his battleships, which are probably of greater tonnage and offensive power. Powers which cannot afford the mastodon battleship must employ smaller units and adopt strategy and tactics which will preclude the possibility of the enemy forcing an engagement with a superior fleet, but will enable them to draw them into mined areas or favorable positions for torpedo attack, and thus wear them down. (Romeo Bernotti, *Rivista Marittima*, July-Aug., 1920.)—*The Technical Review*, Dec. 7, 1920.

MISCELLANEOUS

SAVING THE NATION'S CEREBRATION.—Human inertia is the greatest drag on the wheel of progress. The stranger or the strange idea is always suspect. National and racial habits and prejudices are harder to eradicate than evil habits in the individual. It has taken America one hundred and thirty-one years after adopting the first written political constitution in the world to concede to women their constitutional right of franchise. England will as soon give up its king and its holy lords as its system of weights and measures—both relics of a primitive age—so strong is the tyranny of the dead over the minds of the living.

So great is this inertia that we find as enlightened a body as the Hartford Chamber of Commerce voting against the adoption of the metric system. They reject an instrument which effects such a saving of time—time which is of the very essence of life—time which the proverb says is money, as employers know to their cost. Who will ever calculate in life lengths the time wasted in the highest paid branch of engineering by the use of utterly unnecessary processes of multiplication and division, with an infinity of factors, and the checking and correcting of errors?

Our brutally arbitrary standards of feet and inches having no basic relation to our gallons and pounds, what a complex process it is to reduce cubic feet to gallons or pounds? Our foot is supposed to be the length of an English king's foot, although there were some kings more generously endowed than others with both feet and understanding. The gallon and the pound have not even this poor basis to build upon.

How different it is with the metric system in which there is nothing arbitrary and no two things unrelated! The meter, the one ten-millionth

part of the quadrant of the Paris meridian, is directly related to the liter, the standard of capacity, which is a cubic decimeter, and the gram, the weight of a cubic centimeter of water at four degrees centigrade. How different are the meter, the liter and the gram when compared with our foot, gallon and pound! How easy it is to reduce meters to liters and grams as compared with the kill-brain process of converting feet into terms of gallons and pounds!

How much more difficult it is to multiply or divide by 61½, 268.8, 537.6, 2150.42 or 1.244, when we wish to reduce a given quantity into pounds, pecks, bushels, gallons, inches or feet, than the mere changing of the position of a decimal point!

How few can tell off-hand how many cubic feet or inches in a peck, a bushel, or how many pounds in a cubic foot of water? How many college graduates can tell you? Recently when an engineer testified in court that a cubic foot of anthracite weighed 54 pounds not a single judge or lawyer questioned the accuracy of the statement until a miner in the audience said in a stage whisper: "He's thinkin' av Ivory Soap!" Yet a French school boy will convert liters and decimeters into grams at your will. Oh, the brutal waste of the life of holy childhood in learning these endless tables designed by madmen dead and damned!

Let us have the rational metric system, which is as far ahead of our fogy measures as the harvester is beyond the sickle, or the electric motor is in advance of the ox. Why should we lag behind the Latins under the coercion of custom and the ghosts of other days?—*Chamber of Commerce Journal*, Scranton, Pa.

DISARMAMENT POSTPONED.—The time "is not ripe" for the disarmament of the world, thinks Senator La Fontaine, Belgian delegate to the League of Nations Assembly at Geneva. The fact that the Senator is the president of the Belgian Peace Society and a Nobel Peace Prize winner makes his statement all the more remarkable. Britain and France, we are told by the Geneva correspondent of the New York *Times*, "in view of the unsettled state of world politics, to say nothing of the fact that the United States, Germany, and Russia are still outside the League," will make haste slowly in the matter of disarmament. France not only wishes to be sure that Germany is thoroughly disarmed and kept in that state before she will act, but is also curious as to the armament policy of other nations. All nations agree, says the correspondent of *The Times*, that "the cooperation of the United States is essential if disarmament is to become real and general," and that "League leaders insist that whether America joins or not she will always be interested in disarmament and can afford to take in proposed discussions of the subject." Following close upon this dispatch, however, came the President's declination of the League's invitation to send delegates to take part in disarmament discussions "in a consultative capacity," although disarmament, in the words of the President, "is so necessary for the economic rehabilitation, peace, and stability of the world."

A day or so later, General Bliss, a member of the American Peace Commission, suggested that the United States "take the lead in a definite peace proposal and demand for a reasonable limitation of armament," since the League, which had been deliberating upon the question for more than three weeks, concluded that "disarmament of the world must be a slow and gradual process." The League, however, according to the New York *Tribune's* Geneva correspondent, approves the proposal of the commission having charge of disarmament matters "that all nations within the League agree not to spend more in the years 1922 and 1923 in preparation for war than they will spend in 1921." This resolution was made in the form of a recommendation from the Committee to the Council.

The next development, which scored a point for the League, in the opinion of Democratic papers, was the announcement of the Secretary of

the Navy that "if the United States is not to enter into any agreement with the other powers of the earth which are now bound together in the League of Nations," he "would feel compelled to approve . . . . another three-year building program." Viscount Ishii, Japan's delegate to Geneva, thereupon announced that Japan cannot reduce her armaments "as long as the United States is increasing hers." A sort of deadlock on the disarmament question then descended upon League deliberations. The Chicago *Evening Post,* however, reminds Japan that she "has nothing to fear from American armament, unless she challenges it by a direct attack upon American rights." Continues *The Post:*

"The situation might be stated in other terms. It might be said that the United States cannot modify her present armament policy as long as Japan maintains a menacing attitude toward the open door in the Orient and hints at a possible *casus belli* in our treatment of the immigration problem."

"But it is idle for the world to talk of disarmament so long as the United States sets a pace like this in naval construction," declares the Newark *Evening News,* and the New York *Globe* admits that "Japan must prepare to defend herself if we seem to be preparing to attack." "The German Navy is destroyed, therefore the great American Navy can only exist as against one of two powers—Great Britain or Japan," adds the Newark paper. And we read on:

"We have no great fundamental difference in principle at issue with either of these powers. There is no question between us which cannot be settled by discussion and which can only be met by force. Commercially, if these nations are our rivals they are also among our best customers.

"Viscount Ishii is fair. We are more of a menace to Japan than Japan can be to us. If they are in danger, the Japanese must meet it as adequately as they can. Japan cannot stop increasing her navy until we do. As with ourselves, the sea is her first line of defence.

"Secretary Daniels advertised what our situation was when he divided the fleet, placing one-half on the Atlantic and the other half on the Pacific. That was rotten strategy in a military sense, but a little more conspicuous advertisement of the fruits of our drift than placing them both together at Panama, which amounts to the same thing. His new navy estimates are further advertisement.

"Viscount Ishii speaks with reason. He not only spoke to the Assembly, he spoke to America. If we insist upon going the way we are headed, the blame for what happens will be largely our own. We are sowing the fruit that our children must reap."

In other words, asserts the Baltimore *Sun,* "we must choose between a peace policy and a war policy. To cry 'Peace, Peace,' and at the same time to propose another period of mighty naval construction must arouse suspicion and tend to postpone indefinitely the beginning of any real international cooperation on the subject of disarmament." "The way to disarm is to disarm," crisply notes the Pittsburgh *Gazette Times.* General Bliss, in making his proposals, admits that "they do not guarantee against war"; that he knows of nothing that will. But, he adds, "they will have a tendency to deter any nation from undertaking international war." Continues the General in his speech before the Philadelphia *Public Ledger* forum:

"We are saying to the world, 'We do not wish to join in any formal association with you because we fear it will not make for our peace, but war.' They are saying to us, 'We want you because without you there can be no continued peace.' Why should not the United States say to the nations: 'We will take you at your word and will test it to decide its worth. Will you, the nations that accept the preamble to the military peace terms with Germany, sign this further document with us?

"'We will agree with you that each nation that so desires shall keep and build whatever frontier and coast fortifications it wishes. Fortifications cannot stride across the earth, devastating fields and destroying cities.

"'We will agree with you that each nation may maintain its navy. No navy without an army can conquer and hold foreign territory.

"'We will agree with you on a date when we shall simultaneously abolish any military system which is solely necessary for international war.

"'We will agree with you on a date, as remote as the existing conditions make absolutely necessary, when we shall begin the gradual reduction of our armed forces until they are at the limit necessary for the maintenance of internal order.

"'We will agree with you on the proper amounts of material to be kept on hand for the reduced forces. And we will further agree with you to cease the manufacture of material until the amounts now on hand are reduced to what we agree upon as necessary for the reduced forces.'

"If all armaments could be abolished to-morrow there would still be an annual interest bill of at least $9,000,000,000 to be paid by the belligerent nations on the debts incurred in the last war alone. If these armaments are to be maintained you must note that the military and naval expeditures of the great powers for the year 1913 amounted in round numbers to $2,300,000,000. The economic loss due to withdrawal from productive industry could then have been assessed at $1,000,000,000. That meant a total annual loss due to the mere maintenance of military establishments of $3,300,000,000.

"To maintain these same establishments now will cost approximately double that sum, or near $7,000,000,000. Nor does this take into account the accumulation of military material of expensive types in far greater quantities than have been deemed necessary heretofore. So we have staring us in the face a total annual bill of about $16,000,000,000, and this only for a very small number of nations, for many others are staggering under lesser similar burdens which are all that they can bear."

"The maintenance of huge military establishments is a crushing burden," asserts the Syracuse *Herald*, and "the outlay for our army and navy is one of the main excuses for a program of taxation which will call for $4,000,000,000 during the fiscal year 1921-22." And "out of every dollar of the federal government's money 93 cents is spent on wars past or to come," we are reminded by the Springfield *Republican;* "civilization is still being bled white by military and naval expenditure." "Relief from this cost, even for a limited period, say until the debts of the war are paid in part, would ease the burden greatly," points out the Chicago *Evening Post*, and the New York *Evening Post* assures us that "disappointments in the Treaty, resentments among the defeated nations, fears among the victors—all would melt into the background before a concrete gesture against increasing armaments." Granting all this to be true, what is to be done? We read in the New York *Globe:*

"If disarmament program is to mean anything it must be worked out and accepted in advance by a committee representing all the members of the League. This method might lead to the cessation of competitive arming within the League. But there is another danger to be considered. The League must at all times be at least as strong as any possible combination of nations outside the League. Just now it must calculate cold-bloodedly upon being able to resist a combination of the United States, Germany, and Russia. Such a combination is absurdly improbable, but the League must take it into account as an engineer takes into account a strain several times as great as is ever likely to fall upon his bridge or building."

Acting upon a rumor that Great Britain and Japan were to seek an agreement with the United States limiting their respective naval-building programs, Senator Borah, a vigorous opponent of the League of Nations, offered a resolution in the Senate requesting the President to seek an agreement with those powers for a "five-year naval-building truce, with construction programs cut in half during that period." Secretary Daniels opposes such a procedure on the ground that "it would make for suspicion among other nations," but the New York *Times* declares that "Senator

Borah's resolution deserves the most serious consideration." The New York *Evening Post*, recalling that the League was considering disarmament at the time the Senator offered his resolution, believes these circumstances only "enhance the impressiveness of the suggestion," because it shows that "men who are poles apart upon the question of a general reorganization of international relations are at one in their views as to the menace of huge and growing armaments."

But the Washington *Herald* reminds us that—

"Economically desirable and inevitable as disarmament is, it will not prevent wars. War-prevention can come only as do other reforms, through drawing nations together in constantly better mutual understanding; through the settlement of differences by agreement, arbitration, and court action; through building up a repugnance to war with the spirit of international righteousness."—*The Literary Digest*, Dec. 25, 1920.

WHY WRANGEL FELL.—The downfall of General Wrangel, regrettable though it was, caused no surprise in well-informed quarters, where it was well known that, despite his personal abilities and honesty of purpose, he suffered from most of the handicaps that proved the ruin of Koltchak, Denikin, and Judenitch. In one respect he was much worse off. They at least had an abundance of munitions and supplies furnished by the Allies, and if they made no better use of these than they did, the blame rested upon them and those around them. But from the very first Wrangel was short of the necessary uniforms, guns, rifles, ammunition, and other stores. Notwithstanding that the French sent him what they could, he was never able to arm and clothe more than a small proportion of the men who were nominally available for service; and although in the course of his skilfully-conducted campaign, from June onwards, he captured a large quantity of Bolshevik equipment, it was not enough to make good his deficiencies in war material. It would appear that, while considerable portions of his army fought well and put up a strong resistance against the Red onslaught, large bodies of his troops either lost heart or deliberately let the enemy through. In many ways the experiences of Denikin and Koltchak were repeated, and it may be said in general that Wrangel succumbed not to the superior fighting qualities of the Bolsheviks, who except for a few picked Communist battalions, are beneath contempt, but to their overwhelming numbers—they had 28 divisions against his five—and to dissension within his own camp. The Poles will now have to face the consequences of their refusal to co-operate with Wrangel against the common enemy. It is notorious that the vigorous offensive opened by him at the time of the great Bolshevik thrust at Warsaw was in no small measure responsible for the salvation of Poland. When the Riga negotiations were in progress Wrangel sent his chief of staff to Warsaw to try to induce the Poles to unite with the South Russians and Ukrainians in a joint campaign. But, with a woeful lack of prevision that is likely to cost her dear, Poland declined.—*The Naval and Military Record*, Nov. 24, 1920.

INTERNATIONAL CABLE SITUATION.—The International Communications Conference now in session at Washington has directed public attention to this country's dependence on foreign nations for over-seas cable services. More than half of the cables now in use are controlled by Great Britain and its widespread cable system is one of the important factors contributing to the success of the United Kingdom in foreign trade. Speedy telegraphic service across the oceans is to-day essential to the transaction of the world's business and war time events have led to a far more extensive use of cable facilities than ever before. Thus the single span of cable connecting the United States with the Philippines, China, India and Japan has to take care of about ten times as large a traffic as in 1913.

Under the reparations section of the Treaty of Versailles, Germany has been compelled to renounce all interest in the 23,000 miles of cables owned by German companies before the war. How these shall be distributed is one

of the matters to be determined by the International Communications Conference. Their neutralization and being placed impartially at the service of all nations does not appear to have been thought of. On the contrary, England, France and Japan are reported to be bent on retaining the German lines in the North Atlantic and Pacific diverted by them during the war, while the United States feels that these former German cables would form a most welcome adjunct to the American cable system. If no satisfactory allotment of these ex-enemy cables can be arrived at, our government will probably be forced to lay an extensive system of its own so as to obtain direct communications free of all censorship with the principal trading nations of Europe, South America and Asia.

In the present stage of the world's progress, the nation that lacks an adequate cable system is greatly handicapped in its efforts to push its trade. Its commercial travellers are dependent on cable facilities controlled by business rivals, while its ships can communicate with their home ports only to the extent allowed by foreign-owned agencies. There is a widespread and to a certain extent justified belief that telegraphic and cable communications are used nowadays for propaganda purposes and not for the dissemination of authentic news. Recently the Rome press was bemoaning the fact that the French Havas agency, which had an interest naturally to depict happenings in Italy in accordance with French interests, was attending to the distribution of Italian news in the Scandinavian countries, Belgium and Germany. As has been well said, without quick, reliable communication, independent of other national interests, the vast sums we have invested in our merchant marine and in our organizations for foreign trade will never yield full returns.—*The Nautical Gazette*, Dec. 18, 1920.

MEXICO'S FUTURE.—General Obregon's election to the presidency of Mexico may furnish the starting point for better relations between that country and the United States. It is reported that it was a fair, square election—the first since the early days of the Diaz régime.

We are inclined to be optimistic, but our hopes have been so shattered on the rocks of internal dissension and revolution in Mexico that our optimism has clearly defined the limits that cannot be overstepped.

General Obregon knows the United States much better than any of his predecessors in office. It will be remembered that he visited this country during the World War and was taken on a tour of inspection of our great military camps and munition factories. He saw with his own eyes the extensive preparations that we were making for the prosecution of the war to a successful conclusion. He returned to Mexico an earnest advocate of peace between Mexico and the United States. He must realize that Mexico's recovery depends, in a large measure, upon the restoration and maintenance of amicable relations with the United States. This is a simple matter. The United States merely demands reasonable respect for the rights and property of its citizens in Mexico. We have no evil designs on Mexico. All we want is a square deal.

General Obregon's motto is said to be "We want less war and more work." In a signed article for the *Mexican Review* he outlines his program as follows:

After satisfying our internal needs we will attack the foreign debt. The principle will be paid in full as it comes due, of course, if we can possibly pay; otherwise we will make arrangements for extension which will satisfy our creditors.

When that is done we will talk about borrowing more money for the rehabilitation of our railroads and the building of our ports and other public works which have been allowed to go to pieces.

Whatever money we borrow will be devoted to public works only. That guaranty I will personally give. Not one penny of borrowed money will be spent for the current expenses of the government.

Our army will be cut in two. It will be reduced to one-half its present size, or 50,000 men, and will be well paid, clothed, equipped, and modernized. The 50,000 men retired will be aided to go to work on farms. We are now trying to discharge men in regions where work is plentiful and well paid. These men will remain in the service, subject to call.

I shall propose to congress that the generals be paid a lump sum in lieu of retirement pay that will enable them to buy homes or go into business and increase production. I shall try to reduce the number of clerks in government employ, too, and do away with sinecures.

Obregon's opportunity is at hand. No Mexican ruler since Diaz has faced such a favorable prospect. If he will take advantage of the situation and play the game, the success of his administration is assured.—*The U. S. Infantry Journal*, December, 1920.

CURRENT NAVAL AND PROFESSIONAL PAPERS*

Recent Attainments in Wired Radio. *Journal of The Franklin Institute*, January, 1921.

Initiation of Military Explosives. *Journal of The Franklin Institute*, January, 1921.

The Chemistry of the Earth's Crust. *Journal of The Franklin Institute*, December, 1920.

The Ex-German Battleship *Ostfriesland*. *The Journal of the American Society of Naval Engineers*, November, 1920.

The Operation of Forced Draft Blowers in Parallel. *The Journal of the American Society of Naval Engineers*, November, 1920.

The Annual Report of the Director of Air Service, U. S. Army. *Flying*, January, 1921.

Railway Artillery. *Journal of the U. S. Artillery*, December, 1920.

Moral Instruction and Leadership. *The Journal of the Royal United Service Institution*, November, 1920.

Imperial Strategy and a Combined Staff. *The Journal of the Royal United Service Institution*, November, 1920.

The Solid Injection Oil Engine. *Power*, December 28, 1920.

Review of the Year 1920. *Scientific American*, January 1, 1921.

Our Ignorance Concerning Lubricants. *The Engineer*, Dec. 17, 1920.

The Engineer Graduate. *Engineering*, Dec. 10, 1920.

Tidal Power Development. *Engineering*, Dec. 10, 1920.

Wireless Telegraphy and Telephony during the War. *Engineering*, Dec. 10, 1920.

Fuel Oil in Diesel Engines. *Engineering*, Dec. 10, 1920.

The Tidal Hydro-Electric Scheme for the Severn. *The Engineer*, Dec. 3, 1920.

Steel Research. *The Engineer*, Dec. 3, 1920.

The Naval Situation. *Engineering*, Dec. 17, 1920.

The Progress of Civil Aviation. *Engineering*, Dec. 17, 1920.

Electrical Progress. *Engineering*, Nov. 26, 1920.

The Problem of the Helicopter. *Engineering*, Nov. 26, 1920.

Survey of Engineering Progress. *Mechanical Engineering*, January, 1921.

Experience with Geared Propeller Drives for Aviation Engineer. *The Aerial Age Weekly*, Jan. 3, 1921.

---

*These articles are kept on file and will be loaned to members upon application.

NOTES ON INTERNATIONAL AFFAIRS

FROM DECEMBER 10 TO JANUARY 10

PREPARED BY

PROFESSOR ALLAN WESTCOTT, U. S. Naval Academy

GERMANY AND THE PEACE TREATY

REPARATIONS CONFERENCE AT BRUSSELS.—The second financial conference between Allied and German representatives to discuss reparation problems met at Brussels during the third week in December. At this meeting the German delegates requested a credit of 3 billion gold marks for purchase of food, and of an additional 3 billion marks for purchase of raw materials. They insisted that Germany's ability to pay depended on her economic rehabilitation, and that she must be regarded as an essential and integral part of the economic system of Europe. The next meeting of the conference, scheduled for January 10, was afterward postponed until January 25 or later.

EXTENSION OF SPA COAL AGREEMENT.—At the close of the year 1920 Germany was only 500,000 tons in arrears in coal deliveries under the Spa agreement providing for the delivery of 2,000,000 tons a month to France. France insisted that deliveries on this scale, in spite of German protests, should continue through the present year, without the cash payment allowed in 1920.

ALLEGED VIOLATION OF DISARMAMENT TERMS.—In a note dated December 31 the Council of Allied Ambassadors in Paris called Germany to task for failure to carry out the disarmament provisions of the Versailles Treaty and the Spa modifications thereof, requiring the reduction of the regular army to 100,000 men and of the police organizations to a pre-war basis.

According to reports of Marshal Foch and of General Nollet, Allied Military Commissioner in Berlin, the regular army had been thus reduced; but the *Einwohnerwehr* or Home Guards of Bavaria and East Prussia (Anti-Communist and frontier defense bodies) were in effect military organizations and under military rather than police control. Furthermore, it was asserted that German firms had secretly manufactured and exported aviation materials and munitions.

Germany's replies of January 3 and 5 declared in effect that Germany had loyally executed the disarmament terms except in certain points where exact fulfillment was impossible. As for German defense organizations, these were not a part of the regular army, were essential to the preservation of internal order, and would be abolished as soon as circumstances permitted.

AMERICAN REPRESENTATIVE INVITED.—Early in January France sent to the United States Government a copy of the Disarmament Note of December 31 and invited American representation at the Conference of Allied Premiers on this subject and on reparations, scheduled to meet in Paris on January 19. The French Government, it is understood, gave assurances that it did not contemplate hasty or individual action against Germany.

The attitude of the American Government, as surmised in press despatches, was unfavorable toward aggressive action against Germany, and especially toward any policy on the part of France looking toward seizure of the Ruhr valley or permanent occupation of the Rhine provinces. It was felt that fulfillment of her agreements on the part of Germany might be enforced by less violent means, such as clear indication to her that reparation terms would depend on loyal execution of disarmament terms.

GERMAN RHINE CRAFT ALLOTTED.—On January 8, Walker D. Hines, arbitrator in the distribution of German inland shipping under the Peace Treaty, awarded to France 13½ per cent, or a total of 253,000 tons, of Germany's Rhine fleet, their value to be deducted from the sum total of reparations due France. This award was justified by Mr. Hines on the ground that France, by the return of Alsace, had become again a Rhine state. Further distribution of the German river fleet to other Allied powers, as reparation for war losses, will follow later.

It was also announced early in January that France and Brazil had reached an agreement regarding the disposition of former German vessels interned in Brazil. These vessels will be evaluated, and whether sold or not will be credited against Germany's debt to Brazil, the surplus value to be turned over to the Reparations Commission.

LEAGUE OF NATIONS

NEW MEMBERS.—On December 15 the League of Nations Assembly at Geneva elected Austria to membership in the League. Bulgaria, Finland, Luxembourg, and Costa Rica were also admitted later, bringing the total membership to 46 states. In place of Greece as one of the four nations selected by the League Assembly for representation on the League Council, China was chosen, as the result of a vigorous campaign on the part of the Chinese delegate, Wellington Koo. The states represented in the Council are now Great Britain, France, Italy Japan, Spain, Brazil, Belgium, and China.

REVIEW OF WORK OF LEAGUE ASSEMBLY.—Geneva, Dec. 20.—Two conclusions may be drawn from the work of the first Assembly of the League of Nations, which has just closed here. They may seem paradoxical, but they are not.

The first conclusion is that there must be important changes in the covenant if the League is to succeed. The second conclusion is that it is this League or none for many years to come.

It is commonly accepted by all the delegates that the United States will not enter the League at all unless alterations are made in the covenant, and there is no doubt that almost any changes which America might ask would be agreed to. Article X, or any other particular article would be thrown

overboard. The matter of the votes of the British colonies appears to offer the greatest difficulty in reference to what has been talked of as the United States' demands.

Entirely apart from securing the adhesion of America, the experience of the first Assembly has shown that the League will never get any real cohesion until the covenant is changed to give some actual power to the Assembly. There is no matter of real importance within the constructive program of the League which is not now in the hands of the Council. The covenant confers upon this body the specific right to act on enforcing Article X., or on applying Article XVI., or laying down mandate terms, or ruling on amendments. One has only to read the covenant to see that the Council receives the most important duties.

The Council is controlled by Great Britain, France, Japan and Italy, with Belgium. In other words, it is the Allied powers' machine. What it can do was illustrated at Geneva when the big powers, through the Council, refused to let the Assembly even discuss the mandate terms, and, although the Assembly passed resolutions about those terms, A. J. Balfour, on behalf of the Council, stated from the rostrum that the Council would not consider itself bound in the slightest by anything the Assembly did in this respect.

The Assembly had three constructive measures of importance before it—disarmament, the world court and mandates. On all three the big powers had their way against the overwhelming majority of the Assembly delegations.

I am not going into the merits of whether or not this has brought the best results, but the point is to be made that the League will never have the sincere co-operation of all its members so long as four of them really run the whole performance, as is the case at present.—*N. Y. Times*, December 21, 1920.

PLANS FOR WORLD COURT.—By the first of January 22 nations, or more than the majority necessary for its establishment, had signed the convention for the formation of an International Court of Justice, and four nations had agreed to submit to compulsory jurisdiction. The court, which will be formed as soon as these nations have ratified their signatures, will consist of 11 judges, and will be permanently in session at The Hague.

INTERNATIONAL CREDITS COMMISSION.—As one of its most genuinely constructive measures, the League Assembly on December 14 decided to establish a Commission by means of which nations might negotiate loans without direct application to foreign powers. A nation desiring to borrow may notify this Commission of the assets it is willing to pledge—customs, railroads, etc.—and the Commission will set a valuation and authorize the nation to issue bonds to that amount. Then the nation or its business houses may use these bonds in payment of purchases abroad. It is provided that in case the nation defaults payment of the bonds, the Commission shall take over and administer the concessions pledged as security. While apparently involving the League of Nations in the business of bolstering up international credits, the scheme at least opens a way for the resumption of international exchange.

GREAT BRITAIN

EFFORTS FOR IRISH CONCILIATION.—Following the passage of the Home Rule Bill in December, renewed efforts were made by the British Govern-

ment to confer and come to terms with responsible leaders of the Irish Republican Party. Early in January President Eammonn de Valera of the Sinn Fein Republic returned to Ireland. It was reported that he had received an offer to confer with the British Premier in London, and that definite negotiations were actually under way. The unalterable British conditions were stated to be that Ireland should not leave the Empire and that Ulster should be accorded separate control.

LORD READING FOR VICEROY OF INDIA.—Lord Reading on January 6 conferred with Premier Lloyd George regarding the offer made to him of appointment as Viceroy of India. By the British press Lord Reading was regarded as peculiarly fitted to cope with the difficult situation in India, which calls for the putting into effect of more liberal governmental machinery and facing at the same time an organized insurrection against British rule.

TRADE WITH RUSSIA.—On January 8, Leonid Krassin, Soviet Trade Commissioner in London, left for Russia with a trade agreement approved by Sir Robert Horn, President of the British Board of Trade. This agreement is likely to be rejected by the Soviet Government on account of the political conditions attached, which require that the Soviet Government refrain from propagandist or other activities in India, Persia, and the Near East. M. Krassin expected to return in about a month's time either to conclude the compact or to end the negotiations.

ITALY

D'ANNUNZIO EVACUATES FIUME.—In the latter part of December regular Italian military forces under General Caviglia, with the co-operation of naval vessels, began to close in on d'Annunzio and his legionaries occupying Fiume. Zara on the Dalmatian coast surrendered to Italian Government troops on December 26. On December 31, after some fighting and bloodshed, a protocol was signed providing that the poet and his followers should leave Fiume within five days. Following d'Annunzio's exit, the head of the Provisional Government at Fiume, Dr. Antonio Grossich, fixed February 28 as the date for the election of a Constituent Assembly. Fiume will now become an independent state, in accordance with the terms of the Treaty of Rapallo between Italy and Jugoslavia.

GREECE

CONSTANTINE PROMISES REFORMS.—King Constantine was welcomed with celebrations upon his return to Athens on December 19. At the opening of the newly elected Assembly on January 5 the King read a message in which he advocated various constitutional changes, including the establishment of a Senate as a second parliamentary body. The King reiterated that the government would adopt aggressive military measures for the control of her new provinces under the Treaty of Sevres, and would endeavor to secure the friendship of Serbia, Rumania, and the Allied Powers.

ARMENIA

WILSON MEDIATION DELAYED.—On December 16 President Wilson notified the League of Nations Council that he had appointed Henry Morgenthau, former U. S. Ambassador to Turkey, as his special representative in the proposed mediation between the Turkish Nationalists and Armenia. At the same time he requested "advice from the Council as to the avenues through which his proffer could be conveyed and the parties with whom his representative should get in contact, as well as assurances that he may count upon the moral and diplomatic support of the principal powers represented on the Council of the League."

On December 26 a telegram was received from the Council requesting information regarding the steps the President would attempt to pursue. In view of Armenia's enforced acceptance of a Soviet form of government and peace with Russia and Kemal Pasha, and in view also of the conflicting interests of the Allied powers in Asia Minor, there appeared little immediate prospect of further action in her aid.

UNITED STATES

RUSSIAN ENVOY DEPORTED.—On January 3 Ludwig C. A. Martens, so-called Soviet Ambassador to the United States, surrendered himself to the United States Department of Labor, as a result of the United States Court decision that he should be sent back to Russia. This decision was based on Martens' status as agent of the Soviet régime in Russia, the open policy of which is subversion of American institutions and government. It was announced that Martens would sail for Stockholm in the latter part of January, and that he would be accompanied by a staff of about 40.

TEMPORARY AGREEMENT OVER CABLES.—The preliminary cables conference in Washington on December 14 announced agreement on a *modus vivendi* by which between January 1 and March 15 all former German cables should continue to be operated "for the financial account of the Allied powers," income and expenses to be apportioned later in accordance with the final disposition of the cables. If final agreement were not reached by February 15, a new *modus vivendi* should be arranged. Negotiations were to continue, with opportunity for representatives to consult with their respective governments.

Press despatches indicated progress toward acceptance of the American point of view, and willingness on the part of the powers concerned that all cables, including those connected with the island of Yap in the Pacific, should be surrendered for disposal in the final settlement.

The Communications and Transit Conference under the League of Nations meets at Barcelona at the close of February.

GENERAL CROWDER SENT TO CUBA.—As a result of the disturbed financial situation in Cuba and the disputed election, General Enoch Crowder visited Havana on January 6 as special representative of the United States Government to confer with President Menocal and submit a report. General

Crowder is probably the best informed American authority on Cuba, and is author of the regulations under which the recent Cuban election was conducted.

Under the Platt Amendment to the Cuban Act of 1901, embodied in the subsequent treaty with Cuba, the United States has the right to intervene in Cuba for protection of life and property when conditions warrant such action. As a result of the November elections, Dr. Alfred Zayas, Coalition candidate, was recently elected and should take office on May 20, but there are sufficient missing or disputed votes to raise the possibility of throwing the election to General Gomez, the Liberal candidate. Two of the three previous elections in Cuba have been followed by uprisings.

A moratorium was declared in Cuba in October and later extended until February 1. Various banks have become insolvent, chiefly owing to the drop in sugar prices and difficulties of readjustment, and other banks have taken advantage of the provisions of the moratorium preventing depositors from drawing more than 12 per cent of their accounts. This leaves the sugar factories without means of financing the movement of their crops.

AMERICAN CONTROL IN SANTO DOMINGO RELAXED.—Washington, Dec. 24.—President Wilson today ordered a relaxation of American military rule in Santo Domingo as an initial step in the direction of the complete self-government of the Dominican people. For four years the United States Government has been in military occupation and control of Dominican territory and affairs, with a naval officer serving as Military Governor, having intervened in Santo Domingo in November, 1916, with the declared intention of restoring order and prosperity in that country.

In view of the substantial accomplishment of the objects for which the military occupation of Santo Domingo by the United States was undertaken, President Wilson has directed Rear Admiral Thomas Snowden, the present Military Governor of the country, to issue a proclamation announcing that the United States Government believes the time has come when it might "inaugurate the simple processes of its rapid withdrawal from the responsibilities assumed in connection with Dominican affairs."

Admiral Snowden was instructed to announce to the Dominicans in his proclamation that the formation of a commission of representative Dominicans would soon be completed. This commission will be entrusted with the formulation of amendments to the Dominican Constitution, will revise the laws of the country and frame a new election law, which, when approved by the American Military Government, will be submitted to a Dominican constitutional convention and the Congress of the Dominican Republic for approval. After that the United States will withdraw its forces from the country.—*N. Y. Times*, Dec. 25, 1920.

JAPAN

WOULD END ANGLO-JAPANESE ALLIANCE.—Tokio, Jan. 5.—The post-holiday period is witnessing a resumption by the press of the disarmament discussion, in which consideration of the Anglo-Japanese alliance plays a prominent part.

The Osaka *Asahi Shimbun* has come out in advocacy of the abolition of this alliance as a means of reaching an understanding with the United States. It argues that England's post-war policy is directed toward an understanding with America, England no longer having need of Japan as an ally, and pro-Americanism becoming the basis of her policy. The United States may not reciprocate, the newspaper comments, but nevertheless Japan, it says, should realize the futility of relying upon England. If

Japan and England desire to restrict armaments, it argues, it is essential that they eliminate the alliance, which has the effect of arousing American suspicion, and it advises the Foreign Office to reconsider its practice of pivoting its policy on that alliance.

"Let us abolish the alliance," it adds, "and then talk to America face to face, with open minds."—*Associated Press.*

AMERICAN-JAPANESE TREATY NEGOTIATIONS.—During December, in spite of the absence of Secretary of State Colby in South America, negotiations continued in Washington between Ambassador Shidehara and Roland S. Morris, United States' Ambassador to Japan, with the object of formulating an agreement which should settle the question of Japanese immigration on terms acceptable to both powers.

On December 26 it was announced that the ambassadors were ready to submit reports to their respective foreign offices, and that these reports would recommend an amendment to the existing commercial treaty by which Japanese subjects in the United States would be accorded the same civil and property rights as other aliens. Japan on her part would undertake complete prevention of emigration of Japanese labor to the United States and Hawaii, though not to the Philippines.

Such an agreement would render the recently passed California law ineffective against Japanese land ownership, but California might adopt new legislation, similar to that in British Dominions, excluding all aliens from land titles.

ALIEN OWNERSHIP OF AMERICAN OIL.—Washington, Jan. 6.—While Great Britain obtains about 80 per cent of the oil used on her merchant and naval vessels from the United States, at prices varying from $1.80 to $2.40 a barrel, at the same time she charges American ships $7 to $12 a barrel for oil in the Near East, Senator McKellar of Tennessee asserted in the Senate to-day. Senator Phelan of California added that California oil companies controlled by the British sold their oil to Californians for $2.40 a barrel, while they sold the same oil to the Japanese for storage in Formosa at about $1.80 a barrel.

Senator McKellar brought the oil problem to the floor in a speech in favor of the passage of his bill which demands for Americans the same rights in foreign countries that foreigners enjoy in the United States. Senator McKellar declared that there was no reciprocity in the British policy—a policy by which, he added, England was able now to conserve her own vast holdings while at the same time tapping most liberally the fast diminishing American oil supply.—*N. Y. Times,* Jan. 7, 1921.

REVIEW OF BOOKS

"Nautical Tables Latitude 30° to 60°." By Harold Bunker, lieutenant (j. g.), U. S. Naval Reserve Force.

These tables published by Imay, Laurie, Morie and Wilson, Ltd., 156 Minories, London, in 1920 represent an effort on the part of the author to contribute to the already existing mass of tables, one which combines the required data for finding positions at sea, in the most compact and useful form possible.

They are a distinct advance over the older tables, in that they give the azimuth directly, which is especially helpful in the modern method or "New Navigation."

While the book includes all the tables required for the solution of the position problem, the principal one is "Table V" which contains the altitude and azimuth for every ten minutes of time from six hours before meridian to six hours after; marked 6.00 a. m., to 6.00 p. m., limited however, to bodies from 0°-25° declination north or south and to positions in, from 30°-60° north or south latitude. The latitude and declination are interchangeable of course, and the tables may be used in latitude 0°-25° north or south for bodies whose declinations are from 30°-60°, but this is seldom required.

In spite of the excellent arrangement of the auxiliary tables for facilitating the work, Table V requires far too much interpolation, as not only the table itself but the auxiliaries must be interpolated for accurate work, and this combined with limited application, makes this method far less useful than many others.

The amount of work required to determine the time, is of course, common to all solutions, but from this point that method is to be preferred which produces the required position with the fewest figures and the least number of operations and book openings. Owing to the arrangement of the auxiliary tables on extension leaves, the number of book openings for the Bunker's Tables is least but this is more than offset by the extensive amount of mental arithmetic required.

While under most conditions the determination of the azimuth to within one degree is sufficiently close, the use of the gyroscopic compass and the drafting machine makes a more careful determination of z very desirable, and to get this from Table V requires still further interpolation.

In commenting on these, all types of tables have been considered. Ordinary trigonometric, the haversine, the versine, Ball's, Martelli's and Aquino's. Of these Aquino's are by far "the simplest and readiest in solution" and give altitude and azimuth in adjacent columns on the same page,

for all latitudes and for declinations up to seventy degrees north or south. As the use of the latter enables the navigator to have one type of solution for all sights except meridian altitude, it is to be preferred.

For merchant navigators, however, using the North Atlantic steamer lanes and depending almost entirely on sun sights and the magnetic compass, these tables might be very useful, as shown by the fact that they would have been available for all sights, sun and stars except Vega, a total of 116 sights out of 120 on one voyage from the United States to Brest and return. They cannot however, be recommended for general navigation.

A. M. R. A.

"The Strategy on the Western Front." By Lieut. Colonel H. H. Sargent, U. S. Army.

Like the same author's "Napoleon Bonaparte's First Campaign," "The Strategy on the Western Front," by Lieut. Colonel Herbert Howland Sargent, United States Army (retired), is a rapid glance at the salient strategic features of the mightiest of modern[1] conflicts presented simply and clearly.

The broad treatment of the subject, as well as a few explanations of technical terms, such as *forming front to a flank* and the features of salients, suggests that the book is intended for the civilian rather than for the military student who would demand much more detail than is presented.

Another view, however, might be taken of the author's intentions: that he only offers the outline of a thesis that the strategy of the World War was largely faulty. In this way it is interesting for its several speculations upon the probable consequences of a different strategy.

Reverting to the supposition that the author's principal address is intended to be to the civilian, it might have been appropriate if he had included in his preliminaries a definition of *strategy* in order that the reader might understand exactly the compass of this strategic study. Many civilians, lacking military instruction, think of strategy as the application of strategems, *i. e.*, the trickery of warfare. Even among military men there seems to be a considerable variance in the definition of strategy, if not in its concept. Our own navy regulations, for example, define it as:

"Strategy applies to the distribution of naval forces, their armament and supplies in preparation for war or in the prosecution of war. It includes logistics. It refers to naval movements and dispositions made before contact with the enemy's forces."[2]

An American military authority says:

"Strategy in its most general sense may be defined to be the art of directing the employment of the armed strength of a nation to best secure the objects of the war."[3]

---

[1] Asia suffered a greater war in the thirteenth century when Jenghis Khan's armies killed some thirteen millions in China and probably as many more in western Asia.

[2] U. S. Navy Regulations, 1913, par. I. 5354, subparagraph 5.

[3] Fiebeger, "Elements of Strategy," p. 4.

Most classical writers accept Clausewitz's definition that "Strategy is the employment of the battle to gain the end of the war."[4]

According to this catholic view, the instruments of strategy are armies and fleets applied in battles or held as a threat of battle. The strategist's concern is to so plan all his fighting forces as to insure victory at the decisive point or in the decisive area, *i. e.*, where the victory will break the will of the enemy. For example, he might say, "I will make such dispositions as will tend to attract the enemy to areas "A," "B," "C" and "D" and suffer the enemy to have his victories there, in order that I may have my victory at "E"—the decisive point.

We would therefore expect "The Strategy on the Western Front" to be a discussion of where battles were fought rather than how, for the manner of the fighting is the province of *tactics*.

The author has met this expectation by discussing the offensive and defensive as alternating between the different fronts and has been tempted from that scheme rarely and then only out of apparent deference to the civilian reader, as it were, to give him full measure of information. Without groping through a forest of detail, the reader may pass in the clear light of day from one high peak of momentous military fact to another and then on to another. In the end, it is the reader's own fault if he has not what he impliedly contracted for when he read the title on the bookseller's inviting shelf.

THE THREE ERRORS

There were three great German offensives on the Western Front, we are told, in each of which Germany made a great strategical blunder: the first Marne, the Verdun campaign of 1916, and the offensive begun in March, 1918.

The first alleged error was in attempting the strategical offensive on two fronts at the same time. The Western Front, only one hundred and fifty miles long, was protected by the Moselle and Metz, backed by the Rhine and Strassburg; it could not have been turned by France without violating the neutrality of Belgium or Switzerland. Had Germany held this line defensively with a small part of her combatant forces while she defeated her other enemies in detail, the war would not have lasted more than two years. Thus the Germans would have avoided violating the neutrality of Belgium and the consequential British and American hostility.

The failure of the western offensive is attributed particularly to the strength of Belfort, which commands the narrow pass into France between the Vosges and Jura ranges. "Had the Germans been able to capture this fortress," he says, "the way would have been opened for turning the Vosges and the fortresses of Épinal, Toul and Verdun and for the envelopment of the French right wing, which, with the left wing and the little British and Belgian armies already enveloped, would no doubt have resulted in the final surrender of the French army and the capture of Paris."

[4] Clausewitz, "On War," Bk. I., p. 85.

"This accomplished," he continues, "their next step would have been to cross the English Channel. With their submarines, aeroplanes, and Zeppelins, to protect their transports from attack in crossing, and with no army of any consequence in Great Britain at that time to repel the invaders, it seems not improbable that they would have been successful, although their losses might have been considerable. In Great Britain's poor state of preparedness at that time, and with the flower of her regular troops already destroyed in France, probably less than half a million veteran German troops would have been able to overrun the island, capture London, and conquer Great Britain.

"Then, of course, they would have taken over the British Navy; and with the French Navy already taken over, and their own navy and submarines, they probably would have provoked war with the United States and made short work of the American Navy. With it out of the way there would have been nothing to prevent their transports, loaded with their best troops, from crossing the Atlantic; and with practically no army in the United States to meet them they could easily have taken possession of a good part of the North Atlantic seaboard states, captured New York, Boston, Philadelphia, and Washington, and compelled these cities to indemnify Germany for the entire cost of the war.

"It is easy to see now that at the battle of the Marne Germany was within a hair's breadth of conquering France; and that this most probably would have speedily led to her conquering Great Britain and the United States and her domination of the world. *But Belfort stood in the way.*"

That Belfort happened to be in French possession is attributed to the statemanship and eloquence of M. Thiers. The events of the negotiation at Versailles, during the armistice of February, 1871, are reviewed, in which it is recalled that, during the armistice, the German Army was not to enter Paris. The long discussion between M. Thiers and Prince Bismark resulted in placing the option with M. Thiers of allowing the German army to enter Paris or of surrendering Belfort. Paris paid the price for the retention of Belfort. Thus, M. Thiers' eloquence and Paris' sacrifice in 1871 saved the world from German domination in 1914.

The Second Error: After the battle of the Marne Germany remained on the defensive on the Western Front for about eighteen months, during which she was considerably outnumbered by the Allies. She assumed the offensive in other parts of the theatre of war with successful campaigns against the Russians and Serbians. But before she had entirely disposed of Russia, Serbia and Italy, she again assumed the offensive in the West by way of the Crown Prince's tremendous campaign for Verdun—one of the most formidable in history—which failed. This is charged as a mistake because with the same effort and less loss Germany could "have completed her victories in the Eastern Front, destroyed the army at Salonica, and captured that important seaport; then with greatly superior forces have struck and crushed the Italian army; and then, with all her enemies disposed of outside of France and Belgium, have returned to the Western Front with an enormous preponderance of forces."

The Third Error: After the failure at Verdun the Germans again consigned the West to the defensive rôle, and resumed the offensive against Russia, Roumania, and Italy. But here again the Germans were not persistent, for if they had massed their available forces in turn against Salonica and Italy, probably both would have been disposed of, the Germans would have occupied Greece and the valley of the Po, and would have advanced to the French and Maritime Alps for an invasion of France *via* Nice.

Instead of following up her advantages in the Near East and in Italy, Germany precipitated her offense of 1918 in the West, beginning on March 21, with her powerful thrust at Amiens, followed by the attack against the British around Ypres and two attacks against the French between Reimes and Montdidier towards Chateau-Thierry, in none of which attacks was she able to make a sufficiently broad rupture in the line to allow resumption of a war of movement.

These three severe judgments passed by the author of "The Strategy on the Western Front," viewed in the light of theory and fact, may not be conclusive.

Theory states that governments negotiate by means of diplomacy until the will of one government can no longer be reconciled with the will of another government, when negotiation passes from diplomatic means to the province of Force or War. Strategy then serves the government in lieu of diplomacy. Strategy expresses the will of the government which is the will of the people—always the will of the people in the last analysis, as it was in Germany.

It will be remembered that Russian mobilization and concentration proceeded much more rapidly than the German Great General Staff had anticipated and that Russian armies overran East Prussia with considerable initial success, in fact, with such tremendous success that, out of consideration for the *morale* of the German people, it became necessary to stop the Russian holocaust and the flow of refugees flying westward to spread panic in the empire. Probably nothing that happened during the World War so inspirited the German people to subsequent supreme effort as the great victory of Tannenburg during the last days of August, 1914. Who can say that without that inflation of *morale* they could have sustained the struggle as they did?

Is it not true that Germany's supreme strategic advantage lay in her central position affording her *interior lines?* And if that is true, was it not correct strategy to utilize her interior lines for the movement of forces to reenforce the front that was momentarily most seriously threatened, always making her offensive objective the armed force that, at the time, threatened the most serious damage, instead of selecting any such geographical objective as Salonica, Greece or Italy?

Another consideration that insists upon place in arriving at a judgment as to whether or not German strategy erred in renewing the offensive in the West from time to time visualizes the Allies as in command of tremendous military resources which were organizing to seize a favorable opportunity to take the offensive. German strategy demanded the western

offensive, with offensive tactics, in order to hold the initiative, break up Allied consolidations and disrupt Allied offensive plans that, left to develop, would have materialized into too great a momentum for a German defensive.

These are, of course, great questions that open up almost illimitable vistas of courses that might have been pursued by either side to the conflict and invite mental excursions into the realms of "what might have been." And just as each traveller therein cannot be denied the scenes he describes in passing, he must not be allowed, on the other hand, a certain destination. At least the author of "The Strategy on the Western Front" has presented clearly and interestingly a thesis of scientific importance, for the literature of every war preserves for future use the epochal views of precedents.

In the presence of such gigantic considerations it seems trivial for the reviewer to pass to critical analyses of technical terminology. There is, however, excuse in the fact that the business of fighting is more and more coming to be a science, and with that evolution there is a rising importance in its descriptive phrases. For example, on page 52 of the book in question, in a discussion of the merits of salients, it is said of troops occupying:

"There is a great *strategical* disadvantage; first, because they have too limited a space to maneuver; and secondly, because they are subject to converging fire from the enemy occupying the counter-salients."

It would seem that the word *strategical* should be *tactical*, for the question of kinds of fire are tactical considerations.

Again, on page 54:

"It should, perhaps, be remarked here that the foregoing discussion of a salient has reference more particularly to what may be termed a strategical salient, ..." whereas the discussion appears to indicate a *tactical* salient since it mentions the sensitiveness of occupying troops to converging fire as well as the sensitiveness of the communications of the salient. The Galician salient was a strategical element because its possession would be the issue of several battles and the possible mission of several strategic units; the Chateau-Thierry salient was tactical because its disposal might be determined by one battle, more or less prolonged, and by one army.

On page 49, the expression "defensive-offensive strategy" might not be clear to all readers. Offensive strategy implies the control of the initiative and usually invasion of enemy territory or adjacent seas. Defensive strategy is the reverse. How, then, can a belligerent maintain a *defensive-offensive strategy* at a given time? Some authoritative writers use the expression "The enemy was on the defensive-offensive," one part of the compound noun referring to his strategy, the other part to his tactics. Other writers say "The enemy was on the offensive defensive" (making *offensive* an adjective by the omission of the hyphen), meaning the maintenance of a more or less aggressive campaign (tactically) on strategical lines imposed by the enemy. Although this may be an elementary matter, and certainly is academic, the use of the expressions in question has given rise to much discussion, never satisfactorily determined, in war-college and service-school circles, to which it would be a boon if

someone would issue an authoritative definition, perhaps based upon good usage from a collation of military classics.

The pages presented under the caption of "Unity of Command" serve to remind the reader, possibly with the hope that those high in political authority might take note, that with all the pretensions of the superiority of modern warfare the Allies had to learn from bitter experience the lesson of central command when they might have accepted the principle as unreversed precedent definitely established in the wars of history since the Greeks ignored their law of the land to give single command at Marathon. Justification was as prompt and pronounced in the case of Foch as in the case of Grant.

The chapter about "Foch's Great Counter-Offensive" is one we like to read because it pictures our victories instead of our defeats. In every writer's account of this epoch there is a dramatic climax around the date of the passing of the initiative. "On the evening of July 17, the Allies were on the point of losing the Reims salient, a loss almost certain to bring disastrous consequences. On the evening of July 19 all had changed, the Germans were about to lose the Chateau-Thierry salient; and with it all hope of final victory." The passing of the initiative to the Allies was determined by the exhaustion of German reserve divisions.

Other interesting topics of this rather wide-range book include surprise attacks made possible by two new weapons: gas attack first appearing near Ypres April 22, 1915, and the tank at Cambrai in November, 1917. The tank was an agent of surprise because it enabled the attacking Allies to dispense with the usual elaborate artillery preparation which invariably had given notice of the approaching attack. In this connection it should be noted that the tank was not entirely a twentieth century discovery, for centuries before the Christian Era a protected machine on wheels, carrying archers within the shell as well as a ram worked by the sheltered crew, was employed in the "Two Rivers Country" to force a breach in fortified lines. This ancient weapon was quite the prototype of the modern tank, for its power, protective features, and speed were relatively as great as in the tank, when we consider the relative power of the infantry in the two epochs—the bow and arrow, supported by spearmen, *versus* the high-powered rifle supported by modern artillery. In fact, there was little in the World War that was entirely new. Apparently the modern classical scholar had his day at court in bringing to light old methods that had been buried in the mold of countless centuries of history, for the modern military utilitarian to apply to tremendously important service. Gustaphus Adolphus had also been a student of ancient history and had discovered, in the wonderfully complete Byzantine military organization, evidences of the use of a terra-cotta hand bomb which he revived with improvements as the hand-grenade which, in turn, was forgotten by many generations until revived again for the World War. Liquid fire was also a Byzantine expedient; their armies squirted burning gun-powder through tubes into the faces of the proximate enemy. The swinging bridge equipment used on the British cruiser in the Zeebruge attack must have been suggested by some historian's revival of the story of the *corvus* used in

the battle of Ecnomus, 256 B. C., probably the greatest naval battle in all history, in point of number of ships and men engaged. It is not so remarkable that methods of fighting should develop in circles of time, as that a valuable weapon should fall into disrepute, because the defense against it seems to outstrip its offensive use, only to be revived in an improved form in later centuries. It is suggested that we should not be so fickle as to discard weapons the first time they suffer eclipse by the counter-weapon, but that we should be somewhat patient in improving the old weapon by increments to neutralize the increment of superiority of the counter-weapon.

The estimates of the comparative strength of opposing forces on the Western Front contain the following items of information:

"It is generally admitted by both sides that at the battle of the Marne the Allies considerably outnumbered the Germans.

". . . . of combatants actually engaged in the battle there were probably three million in all.

". . . . if we deduct the German forces employed in the East and those which were in the first instance kept at home for coast defense, the French, English, and Belgians possessed a numerical superiority of something like three-quarters of a million men."

After the battle of the Marne the Allied superiority increased up to September, 1915, when Frank H. Simonds estimates their numbers as:

French	2,000,000	
British	750,000	
Belgians	100,000	
Germans		1,500,000
Allied superiority		1,350,000

Colonel Sargent estimates that at the time of the attack upon Verdun the Allied superiority was "at least half a million men." He goes on to say: "For a year and a half following the attack at Verdun, the Allies seem to have outnumbered the Germans by several hundred thousand."

On May 25, 1918, the number of combatant forces on the Western Front are said to have been as follows:

	Divisions	Battalions	Rifles	Artillery
British	50	495	520,000	6,247
French	103	964	674,000	10,103
American	5	60	65,000	458
Belgian	6	108	56,000	699
Italian	2	24	16,000	100
Allied total	166	1,651	1,331,000	17,607
Enemy total	208	1,914	1,654,926	17,168

But this estimate takes no account of more than 600,000 other Americans then in training in France, and that by the end of August more than 500,000 Americans "were ready to take their places on the firing line." By November 1, there were nearly two million American soldiers in France. At

that time the Allied rifle strength had a superiority over the German of more than 600,000.

Discussing "Allied Victories in the East," Colonel Sargent adopts General Malleterre's view that "Whatever resistance the Germans might have been able to make in the West, their military defeat was inevitable after the victories in the Orient over the Bulgarians and Turks." He also adopts the Malleterre view "that if the expedition of the Dardanelles had succeeded in 1915, and if we had taken Constantinople, Russia would have remained a strong military factor, and the war doubtless would have finished two years ago." (This was written in April 1919.)

"The Strategy on the Western Front" will doubtless attract wide attention both here and abroad. European military students are manifesting an increasing interest in American military opinion as well as in American campaigns.

G. C. T.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ARTICLE, 1922

A prize of two hundred dollars, with a gold medal and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best original article on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the article.

On the opposite page are given suggested topics. Articles are not limited to these topics and no additional weight will be given an article in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All original articles published in the PROCEEDINGS during 1921 shall be eligible for consideration for the prize.

2. No article received after October 1 will be available for publication in 1921. Articles received subsequent to October 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best article published during 1921 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more articles receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

5. The method adopted by the Board of Control in selecting the Prize Essay is as follows:

(a) Prior to the January meeting of the Board of Control each member will submit to the Secretary and Treasurer a list of the articles published during the year which, in the opinion of that member, are worthy of consideration for prize. From this a summarized list will be prepared giving titles, names of authors, and number of original lists on which each article appeared.

(b) At the January meeting of the Board of Control this summary will, by discussion, be narrowed down to a second list of not more than ten articles.

(c) Prior to the February meeting of the Board of Control, each member will submit his choice of five articles from the list of ten. These will be summarized as before.

(d) At the February meeting of the Board of Control this final summary will be considered. The Board will then decide by vote which articles shall finally be considered for prize and shall then proceed to determine the relative order of merit.

6. It is requested that all articles be submitted typewritten and in duplicate; articles submitted written in longhand and in single copy will, however, receive equal consideration.

7. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

H. K. HEWITT,
Commander, U. S. N., Secretary and Treasurer.